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ABSTRACT

This study has 3 primary goals: (1) The development of a manpower supply-demand model for medicine in Pennsylvania; (2) Utilization of the model to make projections of physician needs for Pennsylvania from 1971-1980; and (3) A general analysis of the data particularly with regard to the current dilemma in medical care for which Pennsylvania and other states are seeking solutions. The findings include the following: (1) Pennsylvania compares well with other states in regard to physician-population ratios and other general indices. (2) Despite this, Pennsylvania is far from meeting optimum care physician ratios. (3) Basic care specialists such as those in family medicine, general practice, and internal medicine are and will be in short supply unless a radical change in the rate of physician entry into these professions occurs. (4) Some sections of the state are seriously lacking in basic care physicians while others are close to the optimum figure. (5) The need for more physicians in Pennsylvania can be met by: (a) producing more physicians; (b) facilitating the use of paramedical personnel; (c) changing delivery systems to increase physician productivity; and (d) encouraging better geographic distribution to meet rural and urban area needs. (Author/PG)

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A Study of Physician Manpower Demand and Supply in Pennsylvania:

Methodology and Findings

Pennsylvania Department of Education 1973

A Study of Physician Manpower Demand and Supply in Pennsylvania:

Methodology and Findings

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1973

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ERRATA

Due to circumstances beyond the control of all concerned, in order to meet the deadline for publication, certain discrepancies unfortunately appeared in this study. The reader's indulgence is solicited in using this errata sheet.

Page 2	Column one, Item 3, third line, "impact of rising costs in."
Page 44	Column two, end of the last paragraph, "430 of them in direct patient care (Table 8)."
Page 47	Column one, paragraph 4, line 11, "physicians 5.86 per cent of the Pennsylvania medical."
Page 57	Column one, paragraph 3, line 6, "The entry of 226 for."
Page 57	Column one, the next to last line in paragraph three, "from Table 4, i.e., 751 - 90 D.O. graduates = 661."
Page 84	Last sentence in column one, "1,200 in 1968 to 1,850 in 1980."

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CHAPTER I

SUMMARY

A study of physician manpower in Pennsylvania was undertaken in response to a request by the Office of Higher Education, Bureau of Planning. The study, as envisioned, was to have three primary goals:

1. The development of a manpower demand-supply model that would be used with the type of data that are most likely to be available for a given profession such as medicine.
2. Utilization of the model to make projections of physician needs for Pennsylvania from 1971 to 1980 suited to the needs of higher education planning.
3. A general analysis of the data particularly with regard to the current dilemmas in medical care for which Pennsylvania and other states are seeking solutions.

Although Chapter XIII presents a comprehensive statement of the findings of this study, a summary of the principal findings is given here.

Pennsylvania compares well with other states in regard to physician-population ratios and other general indices. Pennsylvania is a medical powerhouse. New York is the only state producing more physicians than Pennsylvania. It produces more physicians than would be proportionate to its share of the total U.S. population. For example, with less than 6 per cent of the population, it is producing approximately 10 per cent of the physicians graduated in a given year.

Nevertheless, despite our good overall showing, Pennsylvania is far from meeting the optimum care physician ratios published by the **Journal of Medical Economics** with the exception of some surgical specialties, e.g., general surgery, where we are nearing a physician surplus. Basic care specialists such as those in family medicine, general practice and internal medicine are, and will be, in short supply unless a radical change in the rate of physician entry into these professions in Pennsylvania occurs. The number of general practitioners is now rapidly dropping but will begin to rise in the late 1970s. This rise is primarily due to the projected increase in osteopaths.

Maldistribution, geographically and in terms of areas of specialization, is as much a harsh reality here in Pennsylvania as it is elsewhere. Some sections of the state are seriously lacking in basic care physicians while others are close to the optimum figure.

Foreign-trained physicians play an important part in meeting our physician demand. However, there are serious moral and ethical questions about their use since most are from underdeveloped nations that cannot afford to lose them. They are often less able to function effectively due to communication difficulties and cultural gap. The study finds 20 per cent of the Pennsylvania physicians who graduated during the period 1961-63 were foreign and foreign trained. Separate in-migration estimates for the year 1967 give a figure of 18 per cent. In many states today one-half of all new physicians are foreign trained.

Medicine to a large degree is the creator of its own demand and demand will vary as the delivery system and medical technology changes. Nevertheless, under our present delivery system there is evidence that Pennsylvania needs more physicians than it now plans to produce or can retain in the state, particularly in the basic care areas of specialization. This need can be met by: (a) producing more physicians (expensive!), (b) facilitating the use of paramedical personnel, (c) changing delivery systems to increase physician productivity and (d) encouraging better geographic distribution to meet rural and urban area needs.

CHAPTER II

AN EXAMINATION OF THE MEDICAL CARE CRISIS VIEWPOINT

The crisis in medical care issue has been the concern of many writers (See references 1 through 19 at end of chapter). Although most writers have taken a crisis oriented position, some dissenting or cautionary voices have been raised by Wanniski[18] and Schwartz[19]. Even so, they acknowledge that problems do exist and that a shortage of physicians is, for the present, a reality. Their concern is over the possibility of our overreacting and thus produce a surplus of physicians. Some are also fearful that we will create undesirable changes in the medical delivery system itself. In their opinion the supposed crisis in medical care does not exist.

There is little disagreement among the writers in the following areas:

1. *Physician Shortage* does exist to some degree. A shortage of 50,000 physicians as of 1969 is the most commonly quoted figure. This is actually a conservative estimate made by the U.S. Department of Health, Education and Welfare.[20] The method used by HEW is explained in a letter from HEW sent in response to an inquiry by the author (See Appendix E).

2. *Maldistribution* of physician manpower, both geographically and in specialized areas, is increasing. There are not enough physicians in basic care and not enough in rural and inner-city practice. The number of physicians in general practice, internal medicine and pediatrics has declined between 1959-67. In 1967, for example, the decline went from 76 such physicians per 100,000 population to 49 per 100,000 population or from one doctor for every 1,316 people to one doctor for every 2,041 people. These statistics are reported in the 1970 Manpower Report of the President.[21]

3. *Medical Costs* are rapidly rising (Table 1) but the largest proportion of this rise is due to the impact of rising in labor intensive, increasingly technology oriented hospital care.[22] Physicians in 1970 netted, before taxes and after expenses, more than four times the median 1970 family income listed in the **Statistical Abstract of the United States-1971**.[23] This represents a slight increase over the 1965 ratio of exactly four times the 1965 median family income.

While the net income of the practitioners has increased, it must be noted that they would have had to increase their 1965 net earnings from an approximate figure of $29,000 to more than $40,435 in 1972 in order to compensate for the increases in cost of living and federal taxation (excluding state and local taxes).

The increase in net income from $24,300 in 1962 to $41,000 in 1970[23,24] and the projected increase to around $44,000 by 1972 (extrapolation by the author) cannot, therefore, be considered as unduly large. It does represent, however, a further definite improvement in financial status for the physician in general. This data is cited by written permission of Medical Economics, Inc., Oradell, New Jersey, publishers of **Medical Economics** and is subject to the limitations inherent in all survey data. One cannot be certain that the physicians actually report all income, those not responding may differ in income, those not included (partnerships, corporations) may have markedly different net earnings.

Physician net earnings have leveled off due to government limitations on reimbursement, foregoing of fee increases due to fear of creeping socialized medicine, consideration of what patients can or are willing to pay coupled with little improvement in physician productivity.[24]

Recent increases in physician income seem to be, in large part, a function of the marked increase in fee collection due to the advent of the medi-plans. Ninety-two per cent of the fees are now collected where much charitable work was previously required for the poor and the elderly.[24]

In general, the medical cost picture seems to be as follows.[22] For all health related purposes we spent $67.2 billion in 1970 as compared with $12.1 billion in 1950 or $26.4 billion in 1960. The percentage of the Gross National Product thus involved has also risen steadily to a value of 7.0 per cent in 1970 as compared with 4.6 per cent in 1950 and 5.3 per cent in 1960. These expenditures include such nonpersonal health

Table 1

The Problem of Rising Medical Care Costs as Reflected by the Consumer Price Index (1957 - 59 = 100)[a]

Year	All Commodities[c]	Average or Annual Change	Total Medical Care[b]	Average or Annual Change	Physicians' Fees	Average or Annual Change	Hospital Daily Charges	Average or Annual Change	Drugs and Prescriptions	Average or Annual Change
1950	83.8	-	73.4	-	76.0	-	57.8	-	86.6	-
1955	93.3	1.9	88.6	3.0	90.0	2.8	83.0	5.0	92.7	1.2
1960	103.1	2.0	108.1	3.9	106.0	3.2	112.7	5.9	102.3	1.9
1965	109.9	1.4	122.3	2.8	121.5	3.1	153.3	8.1	98.1	-0.8
1966	113.1	3.2	127.7	5.4	128.5	7.0	168.0	14.7	98.4	0.3
1967	116.3	3.2	136.7	9.0	137.6	9.1	200.1	32.1	97.9	-0.5
1968	121.2	4.9	145.0	8.3	145.3	7.7	226.6	26.5	98.1	0.2
1969	127.7	6.5	155.0	10.0	155.4	10.1	256.0	29.4	99.2	1.1
1970[d]	(130.0)	2.3	(155.0)	0.0	(160.0)	4.6	(270.0)	14.0	N.A.	-

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[a] Prior to 1965 Alaska and Hawaii are excluded.

[b] From Table No. 79, *Statistical Abstract of the United States--1970*, p. 62.

[c] From Table No. 523, *Statistical Abstract of the United States--1970*, p. 344.

[d] Estimates made from Chart 6 of *The Size and Shape of the Medical Care Dollar--Chart Book/1970*, Office of Research and Statistics, U.S. Department of Health, Education and Welfare, 1971.

care items as research, disease control, construction of medical facilities, etc.

Impact of Medicare and Medicaid Upon Public Funding

The rate of annual increase in the medical care dollar has been markedly influenced by the advent of Medicare and Medicaid in 1966 and 1967 with a concomitant change in the amounts provided from public funds as compared with private payment. Before Medicare, etc., public funds paid 26 per cent (1966) of medical costs, but in 1970 the figure had risen to 37 per cent.[22]

Before Medicare and Medicaid, the annual rate of increase[22] in the medical dollar was 7.9 per cent per year for private funding. During the period immediately following the advent of Medicare and Medicaid (1966-69), the annual rate of increase for private funding had slowed to 5.7 per cent per year, but the public funded medical dollar had risen sharply at an annual rate of 28 per cent per year. This dramatic rise in the public funding increase rate has by 1970 slowed to 9.7 per cent, which is slightly higher than the prior 9.2 per cent rise in Medicare and Medicaid; but the private medical care dollar had a 1970 growth rate of 13.[illegible] per cent which may reflect inflationary trends.

The Influence of Medicare and Medicaid Upon the Cost of Personal Medical Care

The personal medical care dollar has also grown sizably by an increment of some $47.5 billion in 20 years, i.e., $10.5 billion in 1950, $58.0 billion in 1970. Price increases (fees, etc.) account for 47 per cent of the $47.5 billion increase, population growth accounts for 17 per cent of the increase. Other factors, such as increased use of facilities, more hospitalization due to removal of financial barriers for the poor and aged and the advent of new expensive medical techniques and equipment (open heart surgery, kidney dialysis machines, pacemakers, miracle drugs, etc.) account for the remaining 36 per cent of the increase.[22] This figure of 36 per cent, of course, reflects, in part, the impact of Medicare and Medicaid.

Medicare and Medicaid Influence on Medical Prices

Medical prices jumped about twice as fast as consumer items in general in the 1960s, e.g., 1960-66–all items, 1.4 per cent annual increase; medical care 2.6 per cent; 1966-69–all items, 3.8 per cent, medical care, 6.4 per cent.[22]

To gain perspective on why the advent of Medicare and Medicaid should so markedly affect the size of the medical care dollar, it might be noted that the 65 and over population (10 per cent of total population) requires one-fourth or 27 per cent of the medical care dollar. Those aged 19-64 (53 per cent of population) require 57 per cent of the dollar and the under 19 group (37 per cent of population) requires only 16 per cent of the medical care dollar.

Anecdotal Evidence

Those calling for a drastic revision of the medical delivery system usually cite evidence that is either anecdotal in nature or is based on comparative data that are open to question. Even if such evidence is valid, there is always the question of: At what point can a situation be characterized by the terms *crisis* or *total failure*?

The anecdotal material usually takes the form of stories about how difficult it is to obtain an appointment, about long waiting room time, about difficulty in getting a physician to agree to accept you as a patient, about problems in getting medical attention at night and on weekends, about the problem of deficient emergency care facilities or mishandling and about the financial destruction of a family by medical bills in long-term chronic or terminal illness. While there seems to be little doubt that such conditions exist, the question still should be one of how often, where, to what degree. Unfortunately, little to delineate these problems precisely in quantitative terms has been done.

The second line of evidence seems to lie in the use of comparative statistics where the United States is compared with other countries with regard to various accepted yardsticks of national health, such as mortality rates, infant death rates, etc. Such measures reflect to some degree the quality of medical care since they have been improving over the last 50 years or more, but it is equally obvious that they are determined by many factors over which the physician and the medical delivery system has little or no direct control, e.g., cigarette smoking, overeating, air pollution, etc.

In addition, such statistics, when used comparatively, can only be accepted or regarded as valid where the nations or areas being compared are similar in their degree of population and socioeconomic heterogeneity. The fact that the United States ranked 14th in infant mortality, 13th in maternal mortality, 18th in male mortality, etc.[3], or 25th in male mortality and 14th in female mortality out of 33 countries in another study[27], does not necessarily mean that nations higher in these rankings have a superior medical system. For example, the United States ranks 14th, just above West Germany, in infant mortality while the top-ranking countries, in order of ranking, are Sweden, Netherlands, Finland, Norway, Japan, Denmark, Switzerland, New Zealand, Australia, Britain, France and East Germany. Canada ranks 13th just above the United States.[3] The top countries are certainly more homogeneous than the United States plus having nationalized medicine generally. We, therefore, cannot be certain how much of their superiority is due to a lack of cultural and socioeconomic diversity and how much is due to a better medical system per se with equality of delivery to all segments of the population. Our own high rate of violent death may also play a role in the low male mortality figures cited above. While it is indeed certain that factors such as smoking, pollution, poverty, etc., cannot be considered as the sole fault of the medical system or the physician as such, it should also be noted that one cannot ignore such data completely since the medical system does play some role in determining these figures.

Is it, for example, merely accidental that Sweden, which takes 20 per cent of its citizens' tax payments for comprehensive national health care but spends one per cent less of its GNP than the United States for such care, is the top-ranking?[3] Is it accidental that other countries with similar programs are also top-ranking with regard to all indices of health? Yet, these countries have fewer physicians per 100,000 population than does the United States.[28] Of the common market countries, only Italy (179 per 100,000 population) has more physicians per 100,000 than the United States (165 per 100,000 population) and only West Germany (155 per 100,000 population) and Belgium (154 per 100,000 population) even approach the U.S. figure. The possibility, therefore, does exist that these countries may generally give better care while using fewer physicians due to the nature of their nationalized plans, but it is certainly difficult to unequivocally substantiate this. It is, however, worth noting that other industrial nations have either a National Health Service or a National Health Insurance System, and that most of these 22 industrial nations rank above us in these indices.[9] Nevertheless, our medical care at its best is probably the finest in the world technically. It is not accidental that the Soviet Government chose to have an American surgeon do a breast operation on the President of the Soviet Academy of Science.

We have not developed any consensus as to what constitutes optimum care. The problem is that optimum physician ratios, even if they were agreed upon and considered accurate, would be valid only with regard to the medical delivery system involved and the level of technology and demand for services current at the time. As a consequence, all medical delivery system and other cross comparisons literally cannot be meaningfully made based on population to physician ratios.

It would seem that one can only state that the United States has a medical system that has been subjected to a rising volume of complaint due to its rapidly mounting cost; its failure to provide care to rural and inner-city populations that is equivalent to that received by urban residents generally; its apparent neglect of the emergency care aspect of medical practice; the apparent shortage of physicians relative to demand that is a product of the advent of new medical delivery innovations, such as Medicare and Medicaid and the failure, earlier in the century, to increase the production of physicians in proportion to population growth. The only question is, what are some of the possible solutions that have been suggested?

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CHAPTER III

SOME CURRENT STATE AND NATIONAL PROPOSALS FOR SOLUTION OF THE PROBLEM

A notable attempt to solve the health care problem has been made by the Carnegie Commission.[1,2]

The Commission has adopted the following goals.[1]

1. To provide more appropriately trained, health care personnel.
2. To achieve a better geographic distribution of personnel and educational facilities, particularly for the central city and rural areas.
3. To insure more opportunities for women and members of minority groups.
4. To provide more appropriate training for the work to be performed and, in doing so, to respond to the constructive suggestions of students.
5. To relate health care education more effectively to health care delivery.
6. To bring about a more equitable distribution of the financial burden between the federal government and the states, and between the states.
7. To limit costs to the greatest extent possible.

Implementation of these goals is seen as requiring:

1. A 50 per cent expansion in the number of physicians trained in the 1970s over the 1960s and a corresponding 20 per cent expansion in the production of dentists.
2. An increase in physician productivity by increasing the ratio of health care personnel per physician substantially better than the prevailing 10 to 1 ratio by training more nurses and other paraprofessional personnel especially physician's assistants. (Medex, etc.).
3. An improved geographic dispersion of health training centers throughout the country.
4. The creation of health education centers with local hospitals as the foci to be administered by one of 106 proposed health science centers (medical schools). These education centers would:
    a. Train medical residents (M.D. and D.D.S. on a rotational basis).
    b. Engage in continuing education for local physicians, dentists and other health care personnel.
    c. Advise local health authorities and hospitals.
    d. Assist community colleges and comprehensive colleges in training allied health personnel.
    e. Put most of the local advantages of a health science center into areas that do not warrant a full-scale medical school and health center, i.e., within one hour driving time of 95 per cent of all health care personnel.

In order to improve the situation with regard to shortages of personnel, the commission recommends the following reforms[1]:

1. Shortening the typical time required for the medical physician degree, internship, residency, etc., beyond the B.S. or B.A. to six years rather than the present seven to eight years.
2. Creating a degree between the B.A. and medical physician, i.e., Master of Philosophy in Human Biology, Bachelor of Medicine, M.S. in Human Biology, etc., in order to utilize those who do not go on as teachers, medical assistants or associates, etc.
3. Improving the medical curriculum by:
    a. Tying basic science and clinical instruction more closely together.

b. Using *garden variety* as well as *exotic* patients in clinical instruction.

c. Creating alternate curricular paths depending upon the students prior background and interests.

4. Improving the residency period by providing a wider variety of experiences and more of it under skilled supervision.

5. Creating a National Health Service Corps to meet acute rural and central city needs.

6. Creating an Educational Opportunity Bank for needy medical and dental students.

7. Improving the planning of health manpower requirements and supply.

8. Meeting more of the medical education costs by the federal government since physicians can and do move from state to state. Some states are training large numbers of physicians for practice elsewhere (Pennsylvania among them).

9. Greater support of private medical and dental schools by the state.

10. Equalizing levels of support among the several states since some states exploit the investment other states make.

11. Reducing from four to three years the time to complete medical school (See Brehman[36] for an analysis of this proposal).

12. Reducing the residency requirements from four to three years.

13. Combining science work on a campus with that required in medical school to reduce expensive and unnecessary duplication of facilities (See Brehman[36] for an analysis of this proposal).

14. Reducing the faculty-student ratio which is particularly high in medical school.

15. Entering two medical classes a year.

16. Initiating a year-round medical school approach similar to the year-round school concept in public schools.

17. Holding federal research expenditures steady as a percentage of GNP.

18. Increasing the number of allied health personnel by expanding programs and thus increasing physician productivity which would then reduce the need for physicians.

19. Raising the minimum size of a medical class to 100 for a greater economy of scale effect.

20. Using outside hospitals for clinical training rather than, or in addition to, subsidizing a university hospital.

The commission further notes that in the 1960s medical school costs rose twice as fast as higher education costs, but the number of students enrolled increased only half as fast for higher education. Such a finding makes cost control as well as increased productivity imperative if our medical schools are to function properly.

It seems obvious that the commission's proposals are directed to what they believe to be the critical problem, i.e., a physician shortage of at least 50,000,[2] uneven geographical distribution due to the physicians unwillingness to be professionally isolated and distant from opportunities for continuing education, rising expectations for universal access to care, inefficient use of and allocation of scarce physician resources, ineffective medical education financing and rapidly rising costs. Their proposals are, of course, not without their critics including the medical schools themselves.

Most writers on this topic have also tended to emphasize the need for increased output of graduates and/or paraprofessional personnel along with other reforms but some cautionary notes have been sounded by such individuals as Schwartz[3] and federal officials.[4]

Wanniski,[4] for example, points out that there is a fear on the part of some federal officials that we could well be putting too much emphasis on increasing our medical school outputs and thus are risking the creation of a physician surplus later, much as we created one for other professions through our Sputnik induced policies of the past decade.

Although President Nixon, in 1971, signed legislation providing $3.7 billion for health manpower, the administration, according to Wanniski, is reluctant to spend the amount authorized by Congress. The federal government's position seems to be that careful spending of less money can both end the shortage and prevent a surplus of doctors. The administration planners are attempting to create a safety valve that will permit them to level off production, as needed, after creating an initial increase in production.

According to Wanniski[4] their essential concept is one of using a very limited capitation grant of $1,800 per student enrolled rather than Congress's authorized $2,900 figure which was designed to leave only about 10 or less medical schools in financial distress. The Nixon approach is cited by Wanniski [4] as leaving about 20 schools in financial distress but these would then be aided by means of a special distress fund.

HEW estimates, according to Wanniski,[4] that it would thereby save about $60 million that would otherwise have gone to medical schools that were not financially distressed. HEW is indicated as believing that medical schools that are not distressed and do not want to expand, e.g., schools where costs are $50,000 or $60,000 per student because of high emphasis on specialized training and research, will pass up such low capitation grants but needy schools in the South and Midwest, where school costs range between $5,000 and $10,000, will seek such capitation grants.

These *low-budget* schools are seen as the administration's *safety valve* since their enrollments can be rapidly and economically built up by channeling additional special project federal funds to these schools. Since these schools tend to stress basic medicine, the nation will be able to offset its rapidly dwindling supply of general practitioners without producing large numbers of unneeded specialists in the process.

Wanniski[4] further points out that it is recognized by most of the individuals concerned with the medical care problem that a *surplus* would not necessarily mean better or more inexpensive medical care due to greater competition. HEW planners and Senator Kennedy's people as well are quoted by Wanniski as believing that physicians would simply then raise their fees in order to maintain their income and/or increase their discretionary use of surgery and other treatment techniques (e.g., more tonsillectomies), since physicians are to some degree the creators of their own demand.

Schwartz[3], on the other hand, argues forcefully that the proponents of alternative delivery systems exaggerate when they term our present medical care systems as a crisis situation or as a nonsystem that has failed. Schwartz does not deny that problems exist. He does question the uncritical use of comparative statistics for reasons similar to those cited earlier. His position, in its essence, is basically a philosophical one. Not only does Schwartz deny that a crisis in health care exists (problems yes, crisis no!)[3], but he also argues for the intrinsic value of *pluralistic* medicine as opposed to the uniform national health delivery system approach utilized by most of the other major industrial societies. Schwartz[3] sees medicine as thriving best under a competitive mix of private medicine, prepaid group medicine and medical health insurance plans with benefits to both patient and physician. The patient chooses either personal care from private physician or the economies and security of the prepaid group plan. The physician is free to choose between the regular hours and general freedom of group health plans versus the satisfactions and risks of private practice. He warns against the dangers of throwing out the present delivery system bodily and attempting to introduce a totally new approach in delivery systems (Kennedy Plan, the administration's Health Maintenance Organization Concept, etc.). He speaks of the inevitable disruptive effects revolutionary change would bring and the curtailment of physician and patient freedoms that it might or would entail.

Schwartz, in effect, argues forcefully for carefully tailored attempts to solve each of the various problems that beset medicine, e.g., incompetent or unnecessary surgery, malpractice costs, medical costs, shortages of physicians, maldistribution by geography and area of specialism, etc., rather than a let's *"throw the baby out with the bathwater"* approach.

The issue, really becomes one of how serious is the problem? Does it really constitute a breakdown of the medical delivery system necessitating a radical change in the nature of the system? Would the proposals of Senator Kennedy and others provide an adequate solution? Assuming that a major crisis does exist, what can we do now?

Greenberg[5] takes a more alarmist view in his book **The Quality of Mercy!** A Report on the Critical Conditions of American Hospital and Medical Care. In his book, Greenburg also points out various statistics such as these. We spend a larger proportion of our Gross National Product on medical care than any other nation. Twenty-one nations have a higher life expectancy than we have, although he admits the effects of urban life, excesses of smoking, etc., and poverty-neglect. We rank 15th in infant mortality which he says has long been considered as the best index of a country's health status. We would need 40 per cent fewer infant deaths to reach Sweden's status. In 49 of the states the white only mortality rate is higher than that for the highest province in Sweden. In the 1960s we dropped from 13th to 22nd place in male life expectancy and from 7th to 11th in female life expectancy. The U.S. death rate for ages 15-44 is higher (significantly) than that for England and Sweden who both have a lower physician to population ratio and spend proportionately less of their national budget on medical care. One-third of all draftees are rejected for medical or psychiatric reasons. Nearly one of every two Americans have one or more chronic diseases and a large proportion of them do not receive the care they require. The Blue Cross finds that in one out of every 10 American homes someone has an uncared for medical problem and this rises to three out of 10 in impoverished areas. By 1969 the hospital out-patient visit figure had doubled over that of 1963.

Greenberg[5] then makes a strong and forceful indictment of the present medical system and calls for a creative response by physicians, as follows:

> While medicine has moved from the horse-and-buggy to the jet and airplane phase (of medicine history), it has, unlike most other industries, failed to make the necessary readjustments.
>
> Basically, our health care system continues to operate primarily for the benefit of those who provide the service rather than for the consumers. Its principal features are fragmentation, a seller's monopoly with a virtually total lack of competition, the spur to efficiency and innovation in industry-ignorance on the part of the consumer about what he is buying and little, if any, accountability to the public.
>
> In industry, the high level of pay for the workers is generally offset by greater efficiency and higher productivity. This is precisely what is often lacking in the health care field, with its frequent duplication of facilities, the use of expensive facilities where much more economical services could do just as well, and the use of highly skilled personnel for tasks that the less skilled could do. The cost of medical care tends to become prohibitive when it is rendered piecemeal and each piece is paid for separately. There is evidence that when health care services are better planned and organized, costs can be contained and a better level of care can be provided for the same money.
>
> There is no question that we must reset our priorities and invest a greater share of our national income in the training of more doctors and other health personnel and in expanded and upgraded medical services. But the answer is no longer to be found in more money alone. Equally urgent are better ways of using it.
>
> We have barely begun to tackle the things which need to be done to expand group-practice units with their economy possibilities and potential for higher quality, to place greater emphasis on ambulatory services, and provide broad coverage health insurance for such services, to back up physicians to a greater extent with the less costly skills of auxiliary medical personnel, to establish meaningful quality controls, and to give a much higher priority to preventative services for the young, where the greatest payoff is, instead of pouring the bulk of our resources into the care of the elderly.
>
> Doctors must abandon the idea that technological and social change can occur without corresponding change in the organization of medical care. They must surrender some of their long standing prerogatives and examine soberly the impact of their professional conduct on escalating costs. They must become more responsive to the issues of productivity and quality. They must apply to the problems of devising a better health-care system the same objectivity and creative ingenuity, the same courage in discarding outdated concepts and striking out on new paths that have made possible the phenomenal scientific progress of the past two decades.

It may be said then that few writers deny that there are problems. Furthermore, it can be said that the solutions proposed are many and varied. Some of the proposed solutions are discussed below.

Increased Medical School Output

Most writers call for this solution[1,2,6,7,8,9,10] and it would seem to be desirable in light of commonly accepted shortage figures. It is not, however, without its limitations. It could, for example, create a surplus of specialists and leave us with a continuing dearth of family practitioners. It takes a long time for an increase in medical school size to be translated into an increased supply of physicians (six or more years), but the need is here and now. Furthermore, physicians are expensive to train and educate making this solution an expensive long-term expedient.

Increased Use of Paramedical Personnel

The use of physicians' assistants and other personnel to carry out those tasks that the physician can safely delegate and leave to the physician only those tasks that only he can so well do, would theoretically reduce the need to produce more physicians. Paramedical professionals, including nurses, etc., are potentially capable of markedly increasing the productivity of the physician, thus enabling existing and future physicians to treat more patients than before[11,12, 13,14,15]

Such auxiliary personnel are (a) less expensive to train than a physician, (b) require shorter training than a physician, (c) can provide preventative care physicians are presently unable to provide and (d) potentially able to increase the physicians net earnings due to increased productivity in excess of expenses incurred[11]. However, there are implementation problems.

For example, licensure requirements will have to be defined. There is no presently accepted consensual definition of what a physician's assistant is for licensing purposes. The things in which a physician is uniquely trained and which cannot be delegated are relatively few, e.g., surgery, final diagnosis and the prescription of strong drugs. The physician's assistant could theoretically be asked to carry out tasks ranging from simple medical procedures to the complex tasks that are normally handled only by physicians. Licensure by competencies may be required since training programs for physicians' assistants now vary widely in the competencies taught.

The physician's logical fears about the effect of task delegation upon malpractice insurance must be resolved by appropriate legislation and licensing before such personnel can be fully utilized. Physicians will have to be educated as to what tasks they can reasonably delegate, as to the potential increase in productivity and net earnings such task delegation might entail, as to the resulting freedom from routine medical tasks made possible and as to the consequent freedom to concentrate upon the intrinsically more interesting activities for which he is uniquely trained.

Loan Forgiveness and Other Plans to Redress Physician Maldistribution

On the surface the use of loans to medical students as a means of encouraging them to practice in areas of medical need seems to be a logical and forthright approach to the problem and is currently being proposed or implemented.[16,21,26]

The money required for a medical education is a large sum and the state's investment a sizeable one. It seems only natural to require or offer as an option the practice of medicine in areas of need within the state in lieu of a partial or total payment of the loan made to the students. Nevertheless, such *loan forgiveness* programs may not prove to be as efficacious as hoped.

The physician typically earns a great deal of money (highest paid of all professions) and the student could easily decide to repay the loan rather than take advantage of the forgiveness option. Some of the more able may opt for education in a state where no such loan repayment plan exists because of their ability to be competitive in seeking financial aid on the basis of scholarship. Some may well simply default on the loan by leaving the state and making no repayments. The American Medical Association has informed the author that default is a real issue in their loan program with the rate of default increasing rapidly. At one time, it was only one per cent of the monies loaned but the most recent figure is four per cent or more.

Let us assume, however, that the *loan forgiveness* approach does induce the fledgling physician to practice in a needy rural area for several years. The question becomes one of whether such a physician will choose to remain there. This is the essential aim of the *loan forgiveness* program.

It is assumed, tacitly, by the proponents of loan forgiveness, that a physician who practices in such a setting will put down roots and choose to remain when he discovers the satisfactions of family practice. This assumption, unfortunately, is open to question[31].

The experience of the Sears Foundation[26] does not indicate that such optimism is warranted. During the 14 years prior to 1971, the Sears Foundation attempted to identify communities in dire need of a physician. It then provided funds to these communities (largely rural) for the construction of a small well-equipped office for the use of a physician. Assistance in recruiting a physician was given, and the new physician was given financial aid in setting up practice. As of 1971, 162 of these offices had been built and 52 (32%) of them were standing idle due to the physician having departed or due to fruitless efforts in recruitment. As a consequence, the Sears Foundation has abandoned its program. The physicians themselves are reported to have left their practice in these communities for the following reasons.

(1) A lack of professional collegiality, i.e., isolation from other physicians.

(2) No time for or access to facilities for continued education.

(3) Dislike by wife or family of the limitations of small town life.

(4) Desire to specialize.

(5) Long distance to or lack of hospitals for intensive care with much time involved or a relinquishing of their more interesting cases to a colleague in a distant hospital.

(6) The sheer burden of night calls, lack of vacation time, etc., due to being the sole or relatively scarce provider of medical care for the area.

It would seem then that programs such as described in the article *$10 Million Student Aid Program to Increase Number of Future Doctors Likely to Enter Practice in Medically Underserved Areas* [16] will be of limited benefit in the long run unless we can also devise answers to the problem of making a rural physician's life more desirable.

For example, the rural physician's need for continuing education might well be met by either the Carnegie Commission's concept of the Health Education Center[1] or the concept of the Medical School Without Walls[31] which is a variant of the Open University.

The problem of a sense of isolation from other medical colleagues, i.e., lack of professional collegiality and peer review, might be met by the development of strategically located regional health centers. This would involve group practice by four or more physicians[17,20,23,25]. These physicians would be in basic care areas of specialization. This would enable them to provide basic care on a scale and a level of expertise that no single general practitioner could hope to provide. Economies of scale would optimize their incomes due to shared expenses, the use of paramedical personnel and the concommittant increased productivity.

This type of group practice would seem to eliminate many of the objections to rural practice. It provides professional collegiality; frees the physician for continued education with one's practice covered by a colleague; permits a sharing of the burdens of night calls, emergency calls, etc. and permits vacations without being forced to temporarily abandon one's patients.

Furthermore, the location of these centers near a hospital or the provision of fast, effective transportation (helicopter, ambulance, etc.) to the remote hospital for the physician as well as the emergency or critically ill patient would resolve the problem of ready access to a hospital and the continued care of the physician's patients who are severely ill.

If one assumes that the solo physician in a small isolated rural community is no longer a viable concept, and the evidence suggests that this is so, then some way of enabling these centers to serve isolated communities must also be devised. Satellite centers, staffed by paramedical personnel, seem to be one possible solution to this problem since the personnel could be supervised via telephone, teletype, closed circuit TV, etc.,from the regional center with emergency cases sent to the regional center or affiliated hospital(s) via helicopter ambulance, providing immediately necessary care by the satellite's paramedical personnel.

If these regional centers are located in the population center of the region served, then more adequate schools for the physicians' children and more varied social events for their families to participate in will result. Such population centers are also more likely to be close to major transportation routes and facilities.

Such centers (and satellites) might very well be tied in with a health science center (medical school and hospital) responsible for the region by means of remote computer terminals, closed circuit TV, etc. This could provide consultative help, peer review and continuing education comparable to that available to the urban physician.

A variety of other solutions have, of course, been proposed[18,22] including preceptorship programs which the medical schools are rapidly developing (Hershey Medical School, for example). The preceptor program is expressly designed to encourage new physicians to practice in rural settings and to specialize in basic medicine.

As part of his medical training, the fledgling physician is given the experience of working in the field for a given period of time with and under the supervision of a basic care physician. It is hoped that the physician who does this will later choose to practice in such an area. Of course, the question arises, as one writer puts it, *Can Doctors be Kept Down on the Farm* [32] in light of the natural desire of a physician to go where it is most advantageous for him or his family from a professional, educational and socioeconomic standpoint. Such a plan, however, certainly deserves to be tried and retained. It is a way of giving would-be physicians more varied experience and thus enable them to make a more informed choice as to location and type of practice. Only further experience will tell us if it does actually encourage rural or central city practice.

The major proposed reforms are, of course, those involving dramatic changes by legislation of the nature of the medical delivery system itself (e.g., Kennedy Bill) or by the method of payment (medicare, medicaid, medicredit, universal health insurance). Such proposals would go far beyond simple palliatives such as increased funding of medical schools, increased capitation growth based on the number of students being trained, etc. These proposals combine such concepts as the Health Maintenance Organization[27,28], prepaid group medicine[14,15,28,34,35] physicians assistants,[11,12,13] the issue of consumer representation, etc., in order to create a rational system of physician use, production, and allocation that will meet all of the dilemmas facing the present system and which will provide medical care that is measurably superior to that previously possible (e.g., preventative care). Much of the reformers efforts are aimed at achieving uniformly available, quality medical care at minimum cost through reforms directed at reducing unnecessary duplication of facilities, etc.

Such far reaching approaches would undoubtedly change the physician demand picture markedly. They would reduce or eliminate the physical and economic barriers to medical care that normally control or minimize demand for service. For example, the advent of medicare and medicaid and the increased availability of medical health insurance since 1965 has been responsible for a substantial part of the overall increase in the medical care dollar from 1950 to 1970, i.e., 37 per cent of the increase from 1950 to 1970 has been ascribed to the increased use of services.[33]

Some of the increased demand would no doubt be reduced in impact if the adopted approach involved an increased physician productivity due to the greater use of auxiliary personnel and to those economies of scale that are inherent in group practice. It is, however, likely that the increased demand caused by the treatment of conditions that should have been treated much earlier [illegible]) plus a generally increased demand due to [illegible]bility of medical care without the previously [illegible] financial limitations will initially substantially exceed the effects of any increase in productivity that may be achieved.

As Garfield [illegible] has pointed out, a basic deficiency in [illegible] proposals where the financial barriers have been reduced or eliminated, including the prepaid group (Kaiser-Permanente) plan of which he is a part, is an uncontrolled and partially unwarranted increase in the demand for physician services. It is Garfield's contention that the severe impact of medicare and medicaid on the profession during the 1960s is paralleled by what has been the Kaiser Permanente Prepaid Group experience, i.e., the elimination of the fee-for-service has resulted in the removal of the basic economic control over the demand for service.

The result has been a flood of the well, the near-well and the truly ill into the system. As a consequence, the physician is overwhelmed and overworked and the truly ill receive less time and attention than they would otherwise receive. It is a waste of the physician's skills to be dealing with patients who are well but fear they are not, or who need basic physical checkups, etc., let alone the near-well who may only require routine and supportive examination and treatment by auxiliary medical personnel.

Dr. Garfield points out that any system that abandons the check of demand imposed by financial considerations must, therefore, develop an alternative means whereby the well and near-well can be diverted from the physician for treatment, etc., by appropriate auxiliary medical personnel who can deal equally well with their difficulties and at less cost.

Garfield himself is an advocate of the medical multiphasic screening approach for large group plans such as the one in which he is involved (Kaiser-Permanente). In this approach, patients are treated only at the level of expertise required and a preventative care program is made an automatic part of the system. The physicians see only those who need their unique skills.

There is no reason to believe, however, that a judicious physician use of paraprofessional personnel in more conventional solo or group practice cannot be utilized to produce a screening effect or, at least, to provide treatment at the appropriate level of expertise following diagnosis by the physician using data gathered partly by his aides.

In sum, the solutions proposed, and they have not all been described here, are many and varied and would undoubtedly affect physician demand and supply in as yet basically unpredictable ways. Nevertheless, the researcher who seeks to project manpower demand and supply must, in some manner, come to grips with the issue or at least must acknowledge that such proposals, if implemented, will condition any projection that he may make.

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CHAPTER IV

PENNSYLVANIA AND PHYSICIAN MANPOWER

From a purely superficial standpoint, Pennsylvania would seem to be in an enviable postion with regard to physician manpower. It ranked 11th among the states in 1970 with regard to population per physician ratios (Table 2). Historical data developed by Bucher, Cheever, Fay et al,[2] for the Joint State Government Commission (Table 3) indicates that in 1970 Pennsylvania had the most favorable population per physician ratio (660:1) in 64 years.

The 1970 figures given in these two tables do not agree with one another. This may well be due to use of a somewhat different data base in each case, although both are supposedly figures for Pennsylvania's nonfederal physicians of that year. The 1970 ratio in Table 3 for Pennsylvania is certainly the most accurate in that the author of the present study used 1970 census population data (final) and actual figures from the **Distribution of Physicians in the United States--1970,**[1] as published by the American Medical Association, in order to bring the commission findings up to 1970.

Correspondence with Mr. Star indicates that his data (Table 2) is based upon a composite of unpublished data obtained from the AMA and of data from the publication, **Socioeconomic Issues of Health** which is also a publication of the AMA. Such possibly tentative data may well differ from later officially published data due to corrections for death, etc. It is also possible that Mr. Star used estimates of the 1970 populations for the several states in lieu of unavailable figures from the 1970 census.

In any case, the general conclusion is the same, i.e., Pennsylvania has a relatively large number of physicians per capita when compared with other states, and it also has the most favorable population to physician ratio that it has had since around the turn of the century.

Favorable Physician-Population Ratio not Equal to Optimum

There is really no way of being sure that the relatively favorable position of Pennsylvania regarding population to physician ratios means we have enough physicians for our needs. This is true for a variety of reasons. First of all, even New York State, which has the most favorable population to physician ratio (Washington, D.C. excepted), cannot be said to have enough or more than enough physicians. This is simply because we do not know how many physicians New York would actually need for optimum care under our present medical delivery system let alone any of the proposed alternatives.

Furthermore, we cannot be certain that the more favorable ratio of population to physicians actually reflects a highly favorable situation from the standpoint of the typical patient who may be seeking basic medical care. There can be no doubt that in 1904 basic care (general practice, etc.) physicians were the predominant type of physician, but today the specialist is the most predominant type of physician. If historical data were available to the author with regard to basic care physicians, which it is not, it is more than likely that we would find a deterioration in the basic care physician to population ratio over the past half century. In support of this, it should be noted that there has been a rapid fall in the number of general practice physicians since 1963 (see Appendix A).

Even if the basic care specialist ratio had not itself changed during the past 70 years, there would still be the problem of the increasing geographic maldistribution of our physicians due to their reluctance to practice in the rural and central city areas of the state. In this respect, they simply have paralleled the migration patterns of our population as a whole, i.e., they have left the rural areas to live in urban regions and have fled the decaying central portions of our major cities.

As the Pennsylvania Medical Society has found in its operation of a placement service for physicians, there are a number of rural areas in Pennsylvania where a physician is being anxiously sought but without any marked success. Newspaper articles are constantly being written about the difficulties of our more rural and sparsely settled areas in getting physicians. For example, an article[3] in the Harrisburg newspaper, **The Patriot,** of February 3, 1971, describes the plight of Tionesta, a small rural town nestled at the edge of one of Pennsylvania's national forests (Forest County), which had hung a banner *"We Need a Doctor"* over its main street. The closest hospital is 18 miles away. The volunteer firemen ambulance service is available only in emergencies and no doctor is available if someone is sick at home. In 1971, there had been no physician in Tionesta since 1969. The last one left to become

Table 2

Relative Population Per Physician Standing of Pennsylvania in 1970

Rank	State	Ratio[b]
0	Washington, D. C.	339
1	New York	518
2	Massachusetts	604
3	California	619
4	Connecticut	643
5	Colorado	667
6	Vermont	680
7	Maryland	682
8	Rhode Island	740
9	Minnesota	771
10	Hawaii	789
11	Pennsylvania	795
12	Oregon	816
13	New Jersey	821
14	Washington	823
15	Florida	840
16	Arizona	852
17	Illinois	853
18	Utah	871
19	Delaware	882
20	New Hampshire	889
21	Ohio	892
22	Missouri	932
23	Michigan	933
24	Wisconsin	952
25	Virginia	975
26	Louisiana	995
27	Texas	997
28	Tennessee	1,010
29	Nevada	1,014
30	Nebraska	1,018
31	Kansas	1,048
32	Montana	1,103
33	Georgia	1,104
34	Maine	1,112
35	Iowa	1,116
36	North Carolina	1,118
37	Kentucky	1,123
38	New Mexico	1,133
39	West Virginia	1,137
40	Indiana	1,140
41	Oklahoma	1,151
42	Wyoming	1,161
43	North Dakota	1,168
44	Idaho	1,234
45	Alabama	1,331
46	Arkansas	1,340
47	South Carolina	1,341
48	South Dakota	1,354
49	Alaska	1,376
50	Mississippi	1,448

[a] Derived from data given in article by Jack Star, "Where Have our Doctors Gone?" published by Look magazine, June 29, 1971. Figures based upon physicians who are not federally employed or in the Armed Services.

[b] The median state ratio is 985.

TABLE 3

Total Nonfederal Physicians for Pennsylvania
in Relation to Population and Area from 1906 to 1970

Year	Population[1] (000)	Physicians[2]	People Per Physician	Area (Sq.Mi.) Per Physician[3]
1906	7,110	9,957	715	4.5
1909	7,546	11,056	681	4.1
1912	7,986	11,345	694	4.0
1914	8,276	11,611	696	3.9
1916	8,463	11,502	721	3.9
1918	8,524	11,495	740	3.9
1921	8,900	11,348	776	4.0
1923	9,148	11,241	800	4.0
1925	9,478	11,140	824	4.0
1927	9,745	11,405	821	3.9
1929	9,723	11,795	809	3.8
1931	9,707	12,051	801	3.7
1934	9,795	12,608	772	3.6
1936	9,767	12,889	760	3.5
1938	9,952	13,205	746	3.4
1940	9,900	13,529	732	3.3
1942	9,704	13,503	742	3.3
1949	10,390	14,207	735	3.2
1955	10,939	14,927	733	3.1
1957	10,954	14,507	753	3.1
1960	11,319	15,058	752	3.0
1963	11,408	16,030	712	2.8
1964	11,505	16,278	707	2.8
1965	11,618	16,602	698	2.7
1966	11,657	16,814	693	2.7
1967	11,672	17,163	680	2.7
1968	11,750	17,365	677	2.6
1969	11,772	17,584	669	2.6
1970	11,794	17,876	660	2.5

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[1] Population estimates obtained from 1970 Pennsylvania Statistical Abstracts prepared by the Pennsylvania State Bureau of Statistics, Table 5, page 8, with the exception of the year 1969 which is an interpolation and the year 1970 which is the U.S. Census figure.

[2] Total nonfederal physicians in Pennsylvania figures for the years 1906 to 1960 were obtained from *Medical Education in Pennsylvania: Past, Present, Future* (1963) which were derived from AMA Medical Directories for 1958 and 1961. Figures for the years 1963 to 1970 were obtained from the *Distribution of Physicians* special statistical series published by the Department of Survey Research, Center for Health Services Research and Development of the American Medical Association.

[3] The area of the State of Pennsylvania (45,507 sq.mi.) was obtained from p. 11, Table 7, of the 1970 Pennsylvania Statistical Abstract.

a specialist. The town was willing to provide a building for the physician and give financial assistance but all contacts had *fizzled!*

Nearby towns were not much better off. Tidioute had just lost its physician who retired at age 76 after 45 years of practice in this town of 900 people. A young physician did settle in one community, but he was the only practicing doctor in Forest County at that time according to the article! There do, however, seem to be compensations for rural practice in an area such as this, i.e., low taxes, low rents, not one traffic light in the county, excellent hunting and fishing, and a respected and important position in the community.

An article[4] in the **Beaver County Times** of December 8, 1972, indicates that a similar situation exists in Beaver County despite its being adjacent to Allegheny County which contains Pittsburgh. Beaver County at the time of the article had only 159 physicians, including specialists, to serve more than 200,000 residents or roughly 1,258 people per physician. This may not seem too high a population to physician ratio in view of the generally accepted (but apparently unsupported) figure of 1,500 people per physician as acceptable, but 30 per cent (N-48) of these physicians were over 60 years of age (26 were 60-65 years of age, 12 were 65-70 years of age, 10 were 70-80 years of age) and 55 per cent (N-88) were over 50 years of age. This meant that 48 physicians would soon be needed but there had been little success in obtaining physicians in recent years. One factor, cited by the physician quoted in the article, is the lack of a nearby hospital which caused physicians to spend as much as two hours a day driving to three different hospitals in addition to four hours of patient visits at the hospitals. This, of course, left little time for office hours without undue hardship on the physician.

Pennsylvania's Efforts to Solve Its Problem

A great deal of thought and effort has been devoted to the question of how to redress Pennsylvania's medical problems in terms of increased supply, efforts to encourage physicians to enter practice in needy areas, and the development of more effective emergency care facilities and personnel (see references 7-33).

Medical schools, such as the University of Pittsburgh, have developed various programs in response to the needs. Training of physicians' assistants has been undertaken, but currently the most well-developed program is the satellite concept which puts physicians and facilities into areas of critical need (rural and urban). These programs, because of their educative nature, require a hospital in the area and effective peer review procedures. Such programs may well have an impact, but they are new and relatively untried as to their effect on physician choice of location.

The legislators of the state of Pennsylvania have not, of course, been unaware of these problems and of public distress over medical costs and difficulties with obtaining a physician's service or effective emergency care in their respective areas. Bills to encourage physicians to practice in needy areas have been proposed, including one which would forgive the loan indebtedness of a physician who practiced for a given number of years in an area of need, as defined by the Secretary of Health. However, there is some doubt as to whether such an approach would be effective in the long run, i.e., failure of the Sears Foundation Plan after 14 years of effort with 52 of 162 centers built under the plan standing empty in 1972.[6]

Considerable concern has also been expressed by the Pennsylvania Legislature and the late Senator Donolow about Pennsylvania's position with regard to the number of Pennsylvania residents now trained by Pennsylvania's medical schools, the number of their graduates who remain to practice, etc. Answers to these questions have not been readily forthcoming. Some of the data obtained in this study are pertinent to these issues, and it is worth noting here that published data available for 1950-59 graduates has not proved to be markedly different from that of the graduates of the 1960s studied in this report.[34]

During the 1950s, Pennsylvania produced more than its share of the physicians graduated in the United States. The 6,117 graduates of Pennsylvania's medical schools constituted 9.6 per cent of all U.S. medical school graduates during 1950-59, while Pennsylvania's population dropped from seven to six per cent of the total population of the continental United States. Only New York produced a larger share (12.3 per cent) of the physicians produced in 1950-59 with a population that was 9.8 per cent of the U.S. population in 1950 and 9.4 per cent in 1960.[34]

Of the graduates produced by Pennsylvania during that period (1950-59), 68 per cent were residents of the state at the time they enrolled. Pennsylvania, however, ranked 25th out of the 34 states from whom data was available. Eleven states were above 90 per cent, 17 above 80 per cent and 23 above the figure of 70 per cent residents of their state when enrolled in the medical school(s) of that state.[34]

So far as our state's ability to retain its medical school graduates is concerned, Pennsylvania by 1967 had retained 41 per cent of its 1950-59 graduates. A figure that is somewhat higher than the 35 per cent obtained in the present study (Table 6, Section V). The state ranked 17th out of the 35 states for which data was available with 46 per cent of these states retaining a larger percentage of their graduates than did Pennsylvania.[34]

The opposite side of the coin is, of course, the question of what percentage of all graduates of United States medical schools does Pennsylvania attract and how do we stand on this measure relative to other states? The answer to this question can be derived from the same data source already cited[34] by multiplying the per cent of graduates from U.S. medical schools between 1950 and 1959 located in state in 1967 by the per cent of physician graduates (1950-59) located in the state in 1967 who were graduated from out-of-state schools. These latter figures were derived by subtracting the values of the column in Table 29 of reference 34 headed *Per cent of physicians (1950-59 graduates) located in state in 1967 who graduated from schools in state* from the value of 100 per cent. The findings were as follows: Pennsylvania ranked 5th or 6th (one state, Ohio, had the same percentage out-of-state graduate inmigration figures as Pennsylvania) with a percentage value of 2.1 per cent of all out-of-state trained physicians located in the state. California had the greatest attraction (10 per cent) for out-of-state graduates with New York (3.7 per cent), Florida (3.4 per cent), New Jersey (2.8 per cent) and Texas (2.4 per cent) above Pennsylvania (2.1 per cent) and Ohio (2.1 per cent). Of the 11 states with the least attraction, only three, Vermont (0.1 per cent), Utah (0.3 per cent) and Nebraska (0.2 per cent) had medical schools of their own. The rest, New Hampshire (0.2 per cent), Delaware (0.2 per cent), Nevada (0.2 per cent), Idaho (0.3 per cent), North Dakota (0.2 per cent), South Dakota (0.2 per cent), Maine (0.3 per cent) and Rhode Island (0.3 per cent) produced no physicians themselves during this period but were generally low in population relative to the total U.S. population.

In addition to the above states with no medical schools during the 1950s, only Arizona (1.0 per cent) and New Jersey (2.8 per cent) attracted more than one per cent of the out-of-state trained graduates. Arizona is an attractive state due to its climate. New Jersey apparently depended upon New York and Pennsylvania or other surrounding states to supply its physicians despite the fact that it had a population base readily capable of sustaining a medical school. The average number of physicians imported by New Jersey per year during 1950-59 was approximately 179 based on Table 29 of reference 34. This figure is certainly large enough to warrant development of a medical school in that state.

It would seem that Pennsylvania has been competitive in producing, retaining and attracting physicians in comparison with most other states. This fact does not jusitify a rejection of efforts to improve Pennsylvania's ability to retain the physicians that we produce at so much cost. We should seek to make our share of the physicians trained and retained by Pennsylvania more commensurate with our share of the total population. This would involve raising the percentage of physicians retained from the 1967 figure of 41 per cent to 72 per cent.

This figure of 72 per cent was derived as follows. Since 5.5 per cent of all 1950-59 graduates of the medical schools were in Pennsylvania and 71 per cent of these were Pennsylvania trained, then 3.9 per cent of all physicians entering Pennsylvania practice (71 per cent of 5.5 per cent) were Pennsylvania trained graduates. The proportion of the total U.S. population (Continental United States) that Pennsylvania represents is about 6 per cent; therefore, 6 per cent divided by 3.9 per cent will give us the increase required to make the percentage of Pennsylvania trained medical graduates at least proportionate to the population, i.e., a correction factor of 1.765. Since 41 per cent of all Pennsylvania's 1950-59 graduates remained in the state as of 1967, 1.765 times 41 per cent should give the percentage required, i.e., 72 per cent. This would indicate that efforts to approximately double our retention rate, which has now fallen to 35 per cent (Table 6, Section V of this report), are justified if it can be shown that our physician manpower needs are high and not likely to be met by the projected supply.

The question becomes one of asking how can we estimate our physician needs? What manpower demand and supply model can we use?

CHAPTER IV

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CHAPTER V

THE PHYSICIAN MANPOWER MODEL

Projection of need for any occupation or profession cannot be a haphazard process. What is sought is a reasoned estimate of future need based upon a defensible rationale. The basis for such estimates should be well defined and the best way of making the process explicable and clearly rational is through the use of a manpower model that specifies, by implication, the methodology to be used and the nature of the data to be sought. This chapter attempts to summarize the model and rationale behind the projections made for this study.

Rejected Alternatives

Although it was concluded[6] that the approach used by Arnold[5] could be of real value in projecting those occupations for whom detailed census data was available and for whom the sampling size was not too small, this approach was rejected here for a variety of reasons. For example, if a 20 per cent sample is taken of all occupations, then an occupation that is rather rare percentage wise is quite likely to be under or over represented in the sample. Conclusions based on such data must of necessity be suspect.

Since medicine along with other professions has a relatively low number of practitioners in relation to the total population, projections from census data, at less than the state level become suspect. This is particularly so with regard to the rural areas of the state where the number of physicians may be less than ten. A further source of error in the use of census data lies in the fact that census figures are based upon place of residence. Border areas, such as Philadelphia County, may have many physicians who reside in suburban communities of other states but practice in Pennsylvania. Such physicians would not be included in the Pennsylvania count.

To the extent that this is true and is not counterbalanced by practitioners in other states who reside in Pennsylvania, the census estimates are likely to be, to some degree, in error.

For example, the AMA, which claims its physician records are about 95 per cent accurate, based on at least one study[9], indicates that there were 16,885 active medical physicians in Pennsylvania as of December 31, 1970[10] and the American Osteopathic Association lists 1,622 active Doctors of Osteopathy[11] for the same period making a total of 18,507 active physicians. This figure for active physicians is somewhat larger than the 1970 census estimate of 17,528 active physicians.[12] The difference of 979 can be readily accounted for by such factors as the residency based count problem cited above, as well as the possible inclusion by the AMA of recent and foreign medical graduates who have not yet received licenses and who are only temporarily in the state. The census figure is 94.7 per cent of the AMA-AOA figure of 18,507, i.e., a discrepancy of 5.3 per cent.

A study of physician manpower distribution made by George Tokuhata [13] of the Pennsylvania Department of Health used licensing data provided by the Bureau of Professional and Occupational Affairs of the Department of State. Estimates of the number of physicians in Pennsylvania were obtained by Dr. Tokuhata from routinely compiled and maintained computer tapes of the names and addresses of each physician licensed by Pennsylvania (as of July 1, 1970). Dr. Tokuhata's figure of 18,274 physicians in Pennsylvania is only slightly lower than that of the two medical associations (18,507) combined, but higher than the 1970 census estimate of 17,528. These differences could easily be due to differences in data base. The Tokuhata estimate is 98.7 per cent of the AMA-AOA based estimate. The census estimate is 94.7 per cent of the AMA-AOA estimate and 95.9 per cent of the Tokuhata estimate. This suggests that the census figure for Pennsylvania physicians in 1971 was not more than five to six per cent in error and that any projections from census data would have to be corrected by a factor of 1.05 to arrive at an approximation of the AMA-AOA figure or licensing based figure for that projection year.

There is no guarantee, of course, that census findings for other professions will be in such close agreement with data derived from other sources. When one examines data for other professions, such as law and dentistry, he finds similar patterns with the census figure lower than the data from other data sources. The 1970 census, for example, gives an active practice figure of 11,871 lawyers and judges in Pennsylvania[12] while the figure given by the American Bar Association (Martindale-Hubble[14] is 13,557. An independent survey of the Pennsylvania County Bar Association by Frank

Durkee of the Bureau of Information Systems of the Pennsylvania Department of Education[2] resulted in a value of 13,107 which is fairly close to the American Bar Assocaition figure of 13,557.

The picture for dentists seems to be very similar with a 1970 census estimate[12] of 5,575 dentists in active practice as compared with a licensure based figure of 6,525[13] and an American Dental Association estimate of 6,739.[15]

If we assume the licensure based and county bar association data for physicians, lawyers and dentists to be the most accurate, then the 1970 census data has been able to approximate the most accurate figures as follows: 85.4 per cent (dentistry), 90.6 per cent (law) and 95.9 per cent (medicine). Even using the figures provided by the national associations, these figures are 82.7 per cent, 87.6 per cent and 94.7 per cent for dentistry, law and medicine respectively. It is interesting to note here that the profession with the largest number of members in Pennsylvania (medicine) has the lowest percentage differential between the census figure and the other available figures, while the profession with the smallest number of members in Pennsylvania (dentistry) has the highest percentage differential. This, is, of course, what one would expect on the basis of the discussion of the effect of the proportion of individuals out of the total population in a given occupation upon sampling accuracy.

Basically, however, the methods used by Arnold[5,6] were not considered suitable for this study primarily for the following reasons.

Not only was the 1970 census (6th count) data not available when this study began, but medicine was seen as actually a constellation of professions rather than as a single occupation. The census itself does not break medicine down into speciality areas as it does with engineering. In fact, physicians, whether medical physician's or Doctors of Osteopathy, are often lumped together in the published tables.

Basically, the method used by Arnold,[5,6] and the methods outlined in **Tomorrow's Manpower Needs** are useful only when better local data is not available. The use of census data is an expedient, at best, in the absence of other data that is more accurate, i.e., data that is not based on only a 20 per cent sample of the general population. It was noted however that the general manpower model used by Arnold could be utilized to make projections with data from sources other than the census. It was also noted that national growth estimates developed for the occupations listed in the census could conceivably be used to estimate the overall growth of the profession in Pennsylvania in lieu of Pennsylvania data concerning growth, but could not help in projecting specialty growth.

The Manpower Model Used

This study is based upon a generalized version of that used in the Arnold report but expanded to cover variables with which he did not deal.

The generalized model may be expressed by the equation:

Need = Demand – Supply

Where

Demand = Withdrawals + Growth
Withdrawal = Deaths + Retirements + Disability + Job Mobility (Out-migration) + Change to Inactive status
Supply = Terminal degree recipient output from Pennsylvania schools multiplied by the Pennsylvania Graduate holding rate + In-migration + Re-entry into the profession.

The above model was considered as useful because it did not require that the data come from a given source. It was open as to the method of projection used in projecting growth (correlation, eyeballing historical data, federal or other percentage growth estimates for the nation as a whole, etc.). It did not require that data be obtained for every variable in order to be used.

This latter point regarding the possible lack of data, e.g., disability rates for the occupation, is an important consideration. An adequate data base is the most important and difficult problem facing any individual working in this area of manpower projections, particularly with regard to data in the state or local level. (See Chapter VI)

Other noncorrelative approaches to the problem of projecting the need for physicians can also be used if the required local data is available and the assumptions made are considered to be acceptable.

Thoughtful analyses of the problems in manpower projection are available[16] with regard to health manpower projection.[17,18] They make it clear that the state of the art is still relatively primitive and that projections can vary widely depending upon the methodological base and attendant assumptions. Nevertheless, once a model or projection method is selected, the basic issue or problem the researcher has to deal with is one of readily available, accurate data.

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CHAPTER VI

THE PROBLEM OF DATA

A persistent problem for manpower researchers is the lack of readily available and complete data suitable to their needs. State and federal governments, as well as other institutions, collect and compile data based solely upon their current needs. They often discard data when it is no longer current. The result is that manpower researchers not only find the data that they need are not being collected by the institution, they also find some of the needed data have been collected but have been irretrievably aggregated, archived, rather than put on magnetic tape, etc., or simply discarded if not current. This makes the analysis of historic trends difficult and the compilation of the needed data too expensive or time-consuming to undertake when available. What we need is to follow the principle, *"If it's worth collecting, it's worth recording in permanent and readily accessible form."* This would require: (1) careful thought about what we collect, and why, (2) force us to relate data to actual and potential need and (3) encourage the development of planning models that define the data needed.

As a result of the foregoing considerations, no current source of data regarding physicians is able to provide all of the necessary elements of the manpower model described earlier. The medical profession does have national professional associations that do maintain extensive records on physicians. It is this fact that made this study possible. Those professions for whom this is not done pose a real problem for the researcher in manpower. The basic impetus to the development of methods to estimate occupational demand from census data, such as described in **Tomorrow's Manpower** Needs[1,2] and utilized by Arnold[2] was a response to the general difficulty experienced in obtaining manpower data on the state and local level.

In addition, data on retirement rates, mortality rates, disability rates, migration patterns, job mobility and job entry patterns for the professions are difficult to locate or simply not available. What data is obtainable is usually based on occupations in general or the population in general. Professionals who are older may have different mortality and retirement rates than the general run of occupations. Physicians, for example, are 46 years of age on the average[4] nationally. The figures for Pennsylvania are in close agreement with a figure of 45.62 years for male medical physicians and 44.65 years for all Doctors of Osteopathy (Table 50).

The present study is itself based upon several sources. The basic data source concerning physicians (M.D.'s) was obtained from the American Medical Association in the form of a magnetic tape for computer analysis through the cooperation of the Pennsylvania Medical Society. This tape includes all physicians practicing in Pennsylvania on November 26, 1971. The Department of Education's computer analysis of the data has been the basis for not only the present study but also the *Physician Profile* study carried out by the Division of Program Audit, Bureau of the Budget, Commonwealth of Pennsylvania.[5]

Data regarding osteopathic physicians was not available on magnetic tape and was, therefore, obtained by direct analysis of the 1971 Directory of Osteopathic Physicians published by the American Osteopathic Association.[6] The Bureau of the Budget (Program Audit Division) of the Commonwealth of Pennsylvania[7] also used this directory. Where the Program Audit Division analysis resulted in data required for this study, their findings were utilized. This resulted in a considerable saving of time and effort on the researcher's part.

The above data sources have some flaws. However, they have the requisite advantage of being highly detailed about the location and specialty area of the physicians as well as their type of activity (retired, inactive, direct patient care, etc.).

Other data sources are not typically this informative although boards of licensure may be considered as potentially so. The 1970 census, for example, does not provide any detailed breakdown at all and was not available during this study.

The licensing bureau of the Commonwealth lists only the physician's name and address on its magnetic tape. However, these listings include all licensed physicians regardless of geographic location. Other data that is routinely collected during the licensure or renewal of license process is archived (original forms). The time and effort required to go through thousands of such archived forms in order to select data concerning those licensed physicians now practicing in Pennsylvania was considered as too prodigious to consider seriously.

The health manpower study by Tokuhata[9] is based upon such licensure tapes (name and address only). He also used American Medical Association data proportions (per cent pediatricians in direct patient care in Cambria County, etc.) in order to allocate the county, state and regional totals obtained from the licensure boards' tapes.

AMA tapes, although claimed by the AMA to be highly accurate[9], also present difficulties. These tapes, for example, include recent graduates who are not yet licensed. The tapes are based, of necessity, on a survey sampling approach since not all questionnaires are returned. Deaths are not promptly reported and deceased physicians are, therefore, still listed. Also, the data recorded are compiled from a variety of sources in order to follow up on the activity of all physicians. Physicians can and do mysteriously appear in the AMA Directory of a given year despite their having long records of medical service (Table 15, Section X). If this can happen, there is no reason to believe that physicians have not also been dropped from the record for a given year even though still practicing in the area.

Estimates of in- and out-migration for this study were obtained from a 10 per cent sample analysis of the 1967 and 1969 AMA directories listing physicians in Pennsylvania as of December 31 of each of these years. These data are subject to the same limitations as data from the AMA tapes described earlier. They are derived from AMA tapes for the years 1967 and 1969.

Physician supply data over a period of years is also required by the model. The only adequate source of such information proved to be the medical schools themselves. A survey was, therefore, carried out specifically for the present study (Appendix D). This survey data was considered to be highly accurate in that all of the medical schools responded to the questionnaire. However, not all of the medical schools were able to respond to every item due to individual variations as to what data they compile.

Some of the medical schools provided data that was at variance in some instances with that reported earlier to the PDE's Bureau of Educational Statistics. This was apparently due to differences in what students were counted (part-time, left out, full-time) or simply to the fact that such data were generally compiled upon request. Each request was handled as if it were a request for uniquely new data. The results of the survey were, however, treated as definitive for the purposes of this study and changes were made only after inquiry to the institution in question about obvious discrepancies.

The Ideal Data Base

The medical profession is fortunate in that it has national professional organizations that have attempted to compile records of the location, area of specialization, etc., of members and nonmembers alike. This fact is certainly not true for many of the professions for which the Bureau of Information Systems will have to make manpower analyses.

As pointed out earlier, the data that are compiled nationally are limited in nature. Some of the data essential to our model may not be compiled at all by these organizations. There can be no doubt, however, that the American Medical Association and the American Osteopathic Association could collect and compile all of the data required for the manpower model described earlier. The essential problem for the researcher would be one of the degree of accuracy under a voluntary survey approach and the use of multiple data sources for follow-up of new physicians. The question of financial and manpower resources cannot be ignored since these organizations are limited to the financial support of their members.

It should be emphasized that the state's right to license or certify the competence of professionals is the most ideal way to obtain badly needed data for manpower model implementation.

In order to achieve such an ideal data base via the licensing function, the state would have to implement the following requirements:

1. All members in a given profession would have to be subject to the licensing or certification (already true of physicians) requirement.
2. All necessary information for manpower purposes would have to be included on licensure applications and renewal forms.
3. Accurate and complete response to all items must be made mandatory if the license is to be granted or renewed (some states already do this).
4. The professionals in question must be required to renew their license or certification annually, or at least biannually, and to give such information as is necessary to update their current work status and professional location. This is needed for historical trend analysis and revision of existing projections.

5. All licensed professionals who do not renew their license must be followed up to ascertain the reason for nonrenewal. For example, death, retirement, disability, out-migration, simple oversight, etc.

6. All data must be placed in computer access format for analysis year by year. The present Pennsylvania licensure boards do not have the funds and personnel to do this. A great deal of data that could have been used in the present study was, therefore, for all practical purposes, not available to the author. The data required of the respondents remained largely on the original applications and renewal documents which are archived alphabetically by name rather than year. The hard labor required to abstract the needed data would require clerical work of incredible magnitude since the records of all physicians ever licensed are in the archives.

Obviously, full use of the tremendous potential of the licensure bureau for manpower projection would require some major changes in the operation and funding of a bureau and, possibly, legislation regarding such issues as mandatory response to items and requirements for renewal of license. Fortunately, professionals themselves may see accurate knowledge of the manpower demand-supply picture for their profession as highly desirable and thus be willing to support efforts to utilize the licensure function to this end. Those professions not so licensed or certified would require a different data base.

Other data sources such as college and placement offices (for supply and entry rate data), mailing list firms (for physician location and speciality), U.S. Government publications, and special surveys carried out specifically for a study are expensive and/or difficult to implement. All of these services tend to be incomplete with regard to the data needed. They would, at best, be expedient or, supplementary in their role.

To sum up, the best, most accurate, available sources of data on professionals are likely to be (1) licensure boards, if they are properly set up to provide such data; (2) professional associations, if they compile detailed data on members and nonmembers alike; (3) U.S. Census, if no other data are available and (4) universities and/or professional schools (especially if they follow-up their graduates to determine job entry trends and patterns, a badly needed type of research).

Due to the current limitations of these sources with regard to physician data, the findings of the present study may not be as accurate as more precise data would have permitted. Hopefully, however, this study will stimulate the states to reconsider the roles played by their licensing function, and to consider the need for developing a more systematic data base in general for professional manpower studies. Current concern about joblessness among the college trained strongly suggests a need for manpower studies let alone the restricted funds that the states must allocate according to perceived priorities.

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CHAPTER VII

PHYSICIAN SUPPLY

Although the in-migration of foreign doctors has been an important factor in determining the supply of physicians in the United States, the medical schools of the U.S.A. are the major potential source of physician manpower.

National Medical School Supply Data

According to the National Center for Health Statistics,[1] the physician per 100,000 population ratio for the United States, its possessions, territories and military bases had remained relatively static at about 148 per 100,000 population until 1964. Since that time it has risen to a figure of 163 per 100,000 (see Table 81 of the reference).

This means that the number of active and inactive physicians of all types has been rising faster than the population of the United States and its possessions, territories and military bases. What role have our medical schools played in this increase? Does Pennsylvania itself also reflect such an increase?

According to this source (Table 87 of reference 1), in 1949-50 there were 85 medical schools in the United States and Puerto Rico with a total enrollment of 26,881 students. These medical schools graduated 5,926 Doctors of Medicine (M.D. and D.O.) during this period. By 1959-60, there were 91 medical schools (an increase of six) with 31,999 students (a 12 per cent increase for the decade or 1.2 per cent per year). These 91 medical schools graduated 7,508 physicians (a 27 per cent decade increase or 2.7 per cent per year). By 1968-69, there were 104 (an increase of 13) medical schools with 37,712 students (an 18 per cent increase in 9 years or 2 per cent per year). The number of 1968-69 graduates was 8,486 which represented a 13 per cent increase in 9 years or 1.4 per cent per year.

There has been a recent marked increase in the growth rate for student enrollments. This recent increase was preceded by a slackening of the rate during the late 1950s or early 1960s. The observed differences may be due to the existence of a number of new four-year and basic science (two-year) medical schools (eight four-year and six basic science) which had yet to graduate their first class or transfer their graduates to a four-year institution (Table 88 of reference 1).

From 1949-50 to 1959-60, the number of graduates increased by 27 per cent while the population itself increased by only 18.5 per cent. During the period 1959-60 to 1968-69, the number of graduates increased by about 13 per cent while the population increased by about 11.9 per cent.

This represents an overall increase in medical graduate output of 43 per cent during the 20 years from 1949 to 1969 in contrast to an overall 32.5 per cent in the resident U.S. population[2]. Nevertheless, there must have been a slackening of growth during the late 1950s or early 1960s, as indicated earlier, since the 1960-69 growth in graduate output exceeded population growth by only 1.1 per cent. This supposition is corroborated by the fact that the first year class size increased by 20 per cent during the same period (1960-69) as compared with the 12 per cent increase in graduates (Table 87 of reference 1).

Our medical schools have been or are increasing their graduate output at a faster rate than the U.S. population growth would indicate but the question still remains: Are we producing enough graduates to meet our present and future needs? That we may not be doing so is suggested by the marked influx of foreign trained physicians into the United States and the high proportion of foreign trained physicians practicing in the United States.

Foreign Trained Physicians in the United States

According to a recent controversial study by the U.S. Department of Health, Education and Welfare[5], as described in **United States News and World Report**, July 2, 1973[3] and **The Chronicle of Higher Education**,[4] one out of every five to six physicians now practicing in the United States is foreign trained and this does not include those trained in Canada. The study also indicates that there is now one foreign trained physician for every two U.S. medical school graduates serving in approved hospital house staff positions (interns, residents). Over one-half of all candidates for state licensure are now foreign trained. As a nation, we are getting more foreign-trained physicians each year than we graduate from all of our medical schools. (In 1971, 10,540 entered the United States as in-migrant or as visitors to receive specialist medical training while we graduated 8,974 physicians.) The number entering is double that entering a decade earlier.

A large number of the foreign-trained physicians in the United States (63,000, including Canada) come from areas like Asia (21,000), notably the Philippines, India and Korea, South America (10,000) and Africa (1,000). None of these areas can afford to lose physicians that they have trained at such expense.

The report[5] indicates there is growing evidence that the foreign-trained physician does less well on standard licensure tests, are handicapped by a lack of fluent English and *"in some respects they are still treated as second class citizens"* with less pay than the U.S. trained physician.

Paradoxically, our American medical schools rejected 13,500 applicants in the year 1970-71. Many of them had a much *"better basic premedical education than many foreign medical graduates who are imported from abroad as interns."*[3]

In summary, the report[5] says: *"As a result of in-migration and educational exchange policies, foreign physicians have come to the United States in numbers that have benefited this country without much regard to the effect on the remainder of the world."*

In asking the question, *"Has the United States been training too few physicians to meet current needs?"* the report asserts,

> In comparative terms the United States is already one of the world's richest countries in terms of its production and supply of physicians.
>
> It is perhaps more accurate to say that the American health system encourages a relatively prodigal use of physicians, compared with the more tightly organized systems elsewhere, and that this, in turn, reflects the absence of goals and policies for physician-manpower distribution in America.[1]

Foreign physician supply is an important consideration in any attempt to assess physician supply. Supply, once projected, may be considered as an element of physician demand if we choose to consider the possibility of our scaling down our dependence upon foreign-trained physicians. This may be seen as not only a desirable goal but may even be mandatory if foreign governments take steps to reduce their medical *Brain Drain* problems.

There are now, according to the report,[5] more graduates of Thailand's medical schools in New York State than there are in all of Thailand itself (population 38 million). India lost 821 physicians to the United States in 1971. This number is equivalent to the entire graduating classes of about eight United States medical schools. Korea has only 13,000 physicians and yet there were 2,000 Korean trained physicians in the United States as of 1971. These countries would seem to be well advised to take steps to prevent such losses. For that matter, can we continue to act as medical parasites upon the underdeveloped nations of the world? The authors of this report[5] are unequivocal in their condemnation of our use of foreign graduates.

The study's factual findings do not seem to be the basis for its being considered as controversial. The conclusions arrived at, however, contradict the position of the present administration which holds that we do not need to raise federal support of American medical schools in order to increase output because foreign physicians are coming here in large numbers (Casper Weinberger, Secretary of HEW). HEW has, therefore, disavowed the conclusions of the HEW report as not representing HEW's position.

So far as Pennsylvania is concerned, in 1968-69 the seven medical schools of the state (Hershey excluded) produced 8.97 per cent of all of the U.S. medical school graduates[1] while the state itself had but 5.8 per cent of the country's resident population[2]. This represents a comparable disparity to that in the 1950s (see Chapter IV) where the figures were 9.6 per cent of all graduates and 6 to 7 per cent of the population. However, it does reflect a downward trend in the proportion of U.S. graduates produced due to the emergence of new medical schools and increasing output in other states. We are still one of the nation's medical powerhouses when it comes to the education and postdoctoral training of physicians.

Projected Pennsylvania Graduate Output

In order to obtain a detailed picture of present and anticipated Pennsylvania medical school graduate output, a survey instrument was sent to the eight Pennsylvania Medical schools (see Appendix D).

Data obtained from this survey varied in nature. An important item was the number of graduates from the institution during the 1960s and estimates of the number of graduates during the 1970s based upon the medical schools' current growth estimates or plans. Table 4 of this report summarizes the projected growth

Table 4

Actual and Projected Pennsylvania Medical School Graduates 1961-1980

Year	Hahnemann	Hershey	Jefferson	Temple	Medical College of Pa.	Univ. of Penna.	Univ. of Pitts.	Phila. Col. of Osteopathic Medicine	Tota
					Actual Graduates[a]				
1961	93		167	125	40	130	91	79	725
1962	80		146	126	46	134	78	67	677
1963	86		148	124	40	130	88	61	677
1964	92		154	131	43	120	87	82	709
1965	94		157	124	46	124	84	73	702
1966	91		154	132	48	124	90	83	722
1967	106		161	129	38	122	82	83	721
1968	102		157	143	37	129	93	90	751
1969	99		167	134	57	128	88	90	763
1970	100		165	136	50	125	95	81	752
1971	107	33	184	134	51	136	96	106	847
					Projected Graduates[b]				
1972	116	(42)	188	145	(68)	146	105	(125)	935
1973	110	57	192	144	71	147	105	137	963
1974	117	59	207	159	69	152	120	148	1,031
1975	129	60	207	155	67	163	121	151	1,053
1976	148	69[c]	218	175	74	163	126	170	1,143
1977	178	73	218	175	74	163	126	189	1,196
1978	218	78	218	175	74	163	126	212	1,264
1979	238	84	218	175	74	163	132	236	1,320
1980	247	88	218	175	74	163	139	236	1,340

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[a] Based upon data obtained by a survey of the medical schools in 1971.

[b] Based upon projected first-year entrants from the survey returns of the schools including some revised data from the schools as their plans crystallized further and a cohorting of class size data (Appendix C). Actual rather than projected data is given in parentheses for some schools.

[c] Values for Hershey are based on projections of first year enrollment announced by Dr. Oswald of Penn State in The Patriot, Harrisburg, Pennsylvania, August 29, 1972.

findings for each of the eight medical schools and for all medical schools combined as developed in Appendix C of this report.

It is interesting to note that the overall projected growth from 1970 to 1980 represents a 78 per cent increase over the 1970 figure. The maximum growth institutions will be the Philadelphia College of Osteopathic Medicine (191 per cent), Hershey (167 per cent) and Hahnemann (147 per cent). The larger institutions, in terms of graduate output, foresee relatively modest increases i.e., Jefferson (32 per cent), Temple (29 per cent), University of Pennsylvania (30 per cent). The Medical College of Pennsylvania and the University of Pittsburgh envision more substantial increases of 48 per cent and 46 per cent respectively.

Retention of Graduates

The findings of the survey combined with the 1971 AMA data tapes provided by the Pennsylvania Medical Society and the 1971 physician directory of the American Osteopathic Association[6] give some indication as to the comparative tendency of the eight medical schools of Pennsylvania to produce graduates who remain in the state of Pennsylvania as practitioners.

Table 5 of this report gives findings for the eight medical schools, individually and combined, regarding the number of physicians retained in Pennsylvania as of 1971 who graduated during the years 1960 to 1971. Since those graduating recently are likely to be in internships. residency training here or in other states, it is likely that the figures for the classes of 1960 to 1963 or 1964 will best reflect Pennsylvania's capacity to retain its graduates. According to Table 5, we have retained over the long term around 36 per cent of our graduates. This is a figure that is somewhat lower than the 1950 graduate figure of 41 per cent cited earlier in Chapter IV. It is not likely that this is due to our using only those physicians who have been out of medical school for six or more years and who are, presumably, in active, independent practice. Even when one combines all of the graduating classes together, the overall percentage retention figure is [illegible] at 36.8 per cent, lower than the 1950s figure of 41 per cent. This indicates that Pennsylvania's ability to retain its graduates may have eroded during the 1960s.

It is interesting to note that the institutions, had retention rates of about 40 per cent or more (1960-64). However, three schools, Jefferson, the University of Pennsylvania and the Medical College of Pennsylvania, were substantially lower in their median 1960-64 rates of retention. The finding for the first two are not unexpected since they are schools of especially high prestige and may have, during the 1960s, tended to accept a larger proportion of extremely able out-of-state students. These students are more likely to return or to seek practice elsewhere. Partial corroboration of this hypothesis may be found in Table 25 of this report where we find that 69.3 per cent of the University of Pennsylvania's 1970-71 first year class consisted of students who were nonresidents. Jefferson Medical College did not reflect this high nonresident pattern, however, since only 25.5 per cent of its beginning class was made up of nonresidents. This proportion actually represents an improvement over the class of 1960-61 in which Jefferson had 33 per cent nonresidents. A high degree of specialism may well be the significant factor here.

The Medical College of Pennsylvania, in contrast, may seem to have a disturbingly low retention rate. However, it must be remembered that this institution was previously, and avowedly, a medical school whose purpose was the training of women for careers as physicians. Three factors may play a role here. First, it is quite possible that the relatively low proportion of Pennsylvania residents in attendance (Table 25) predisposes the student body to migrate outside although it is not confirmable on the basis of the evidence available to the author. Second, a female physician may find openings for internship, residency and practice in Pennsylvania relatively difficult to obtain. Third, a study reported to the AMA on February 6, 1972 by Ethel Weinberg, M.D. and Edith Levit, M.D. indicates that only 45 per cent of females trained as physicians are in practice. This fact could alone account for the Medical College of Pennsylvania holding power being approximately one-half of the general value of 40 per cent (Table 5).

Retention in Specialty Areas

Tables 4 and 5 do not give us the detailed data necessary to make estimates of supply for individual areas of specialization. Table 6 is, therefore, an attempt to determine the retention for family practice, general practice, internal medicine, pediatrics and general surgery along with other specialties combined as one.

Table 6 gives 1961-63 graduate figures for direct care medical physicians (Section I), active medical physicians in other than direct patient care (Section II); all medical physicians entrants to Pennsylvania

Table 5

Commonwealth Holding Power (Percentage of Graduates) for Pennsylvania Medical School Graduates (November 26, 1971)

	HAHNEMANN			HERSHEY			JEFFERSON			PENNSYLVANIA MEDICAL COLLEGE			PHILADELPHIA OSTEOPATHIC			TEMPLE			UNIVERSITY OF PENNSYLVANIA			UNIVERSITY OF PITTSBURGH			ALL PA. MEDICAL SCHOOLS		
Year	No. Grads.	No. in Pa.	Per Cent	No. Grads.	No. in Pa.	Per Cent	No. Grads.	No. in Pa.	Per Cent	No. Grads.	No. in Pa.	Per Cent	No. Grads.	No. in Pa.	Per Cent	No. Grads.	No. in Pa.	Per Cent	No. Grads.	No. in Pa.	Per Cent	No. Grads.	No. in Pa.	Per Cent	No. Grads.	No. in Pa.	Per Cent
1960	-	41	-				-	67	-	-	19	-	-	30	-	-	48	-	-	40	-	-	44	-	-	289	-
1961	93	38	41				167	57	34	40	8	20	79	35	44	125	53	42	130	36	28	91	44	48	725	271	37
1962	80	32	40				146	56	38	46	8	17	67	30	45	126	47	37	134	41	31	78	30	39	677	244	36
1963	86	37	43				148	56	38	40	8	20	61	20	33	124	54	44	130	30	23	88	39	44	677	244	36
1964	92	37	40				154	39	25	43	7	16	82	38	46	131	49	37	120	36	30	87	29	33	709	235	33
1965	94	35	37				157	51	33	46	15	33	73	31	43	124	47	38	124	26	21	84	16	19	702	221	32
1966	91	27	30				154	48	31	48	16	33	83	43	52	132	49	37	124	31	25	90	26	29	722	240	33
1967	106	45	42				161	74	46	38	11	29	83	35	39	129	47	36	122	42	34	82	27	33	721	281	39
1968	102	41	40				157	57	36	37	8	22	90	41	46	143	54	38	129	42	33	93	29	31	751	272	36
1969	99	29	29				167	60	36	57	18	32	90	38	47	134	72	54	128	38	30	88	25	28	763	280	37
1970	100	51	51				165	54	33	50	19	38	81	43	41	136	49	36	125	47	38	95	30	32	752	293	39
1971	107	53	50	33	14	42	184	83	45	51	20	39	106	-	-	134	68	51	134	51	38	96	53	55	739 (845)[b]	342	46

[a] Graduates for a given year and institution obtained from survey of the institutions and the number retained from a given class was derived from our analysis of the November 26, 1971 data tapes provided by the Pennsylvania Medical Society and from the 1971 Directory of the American Osteopathic Associati .

[b] This is the actual number of graduates if we include the graduates of the Philadelphia College of Osteopathic Medicine for which no class of 1971 retention data was available from the 1971 membership directory of the American Osteopathic Association.

Table 6

A Summary of the Number of Physicians in Pennsylvania as of 1970-71 Who Graduated During the Years 1961-63 With Percentage Figures to be Used in Calculating Future Physician Growth[a]

I. Direct Patient Care M.D.'s

Where Trained	Family Practice	General Practice	Internal Medicine	Pediatrics	General Surgery	Other Direct Care	Total
Pennsylvania	3	100	65	40	38	326	572
% of Column Total	60	71	58	51	51	50	53
% of Row Total	1	17	11	7	7	57	100
% of Grand Total	0	9	6	4	4	30	53
% of 1961-63 Grads[b]	1	5	3	2	2	17	30
Other States	1	29	28	21	14	154	247
% of Column [illegible]al	20	21	25	26	19	23	25
% of Row [illegible]	1	12	11	8	6	62	100
% of Grand [illegible]al	0.1	3	3	2	1	14	23
% of Pa. Entrants[c]	33	29	43	53	37	47	43
Foreign	1	12	19	18	22	180	252
% of Column Total	20	8	17	23	30	27	24
% of Row Total	1	5	7	7	9	71	100
% of Grand Total	0.1	1	2	2	2	17	24
% of Pa. Entrants[c]	33	12	29	45	58	55	44
Combined	5	141	112	79	74	660	1,071
% of Column Total	100	100	100	100	100	100	100
% of Row Total	1	13	10	7	7	62	100
% of Grand Total	1	13	10	7	7	62	100

Table 6
(continued)

II. Active M.D.'s in Other Than Direct Patient Care

Where Trained	Family Practice	General Practice	Internal Medicine	Pediatrics	General Surgery	Other Specialty	Total
Pennsylvania	0	1	7	4	0	55	67
% of Column Total	-	33.33	30	40	0	32.5	32
% of Row Total	0	2	10	6	0	82	100
% of Grand Total	0	1	3	2	0	26	32
% of 1961-63 Grads[b]	0	0	0	0	0		4
Other States	0	1	11	3	1	55	71
% of Column Total	-	33.33	48	30	25	32.5	34
% of Row Total	0	1	16	4	1	78	100
% of Grand Total	0	1	5	1	1	26	34
% of Pa. Entrants[c]	-	100	157	75	-	100	106
Foreign	0	1	5	3	3	60	72
% of Column Total	-	33.33	22	30	75	35	34
% of Row Total	0	2	7	4	4	83	100
% of Grand Total	-	1	2	1	1	29	34
% of Pa. Entrants[c]	0	100	71	75	-	109	107
Combined	0	3	23	10	4	170	210
% of Column Total	-	100	100	100	100	100	100
% of Row Total	0	1	11	5	2	81	100
% of Grand Total	0	1	11	5	2	81	100

Table 6
(continued)

III. All M.D. Entrants to Pennsylvania Practice

Where Trained	Family Practice	General Practice	Internal Medicine	Pediatrics	General Surgery	Other Specialty	Total
Pennsylvania	3	101	72	44	38	381	639
% of Column Total	60	70	53	49	49	46	50
% of Row Total	0	16	11	7	6	60	100
% of Grand Total	0	8	6	3	3	30	50
% of 1961-63 Grads[b]	1	5	4	2	2	20	34
Other States	1	30	39	24	15	209	318
% of Column Total	20	21	29	27	19	25	25
% of Row Total	0	9	12	8	5	66	100
% of Grand Total	0	2	3	2	1	16	25
% of Pa. Entrants[c]	33	30	54	55	39	55	50
Foreign	1	13	24	21	25	240	324
% of Column Total	20	9	18	24	32	29	25
% of Row Total	0	4	7	7	8	74	100
% of Grand Total	0	1	2	2	2	19	25
% of Pa. Entrants[c]	33	13	33	48	66	63	51
Combined	5	144	135	89	78	830	1,281
% of Column Total	100	100	100	100	100	100	100
% of Row Total	0	11	11	7	6	65	100
% of Grand Total	0	11	11	7	6	65	100

Table 6
(continued)

IV. Doctor of Osteopathy Entrants[d]

Where Trained	Family Practice	General Practice	Internal Medicine	Pediatrics	General Surgery	Other Specialty	Total
Pennsylvania	0	62	1	2	4	17	86
% of Column Total	-	68	25	50	57	55	63
% of Row Total	0	72	1	2	5	20	100
% of Grand Total	0	45	1	2	3	12	63
% of 1961-63 Grads[e]	0	30	1	1	2	8	42
Other States	0	29	3	2	3	14	51
% of Column Total	-	32	75	50	43	45	37
% of Row Total	0	57	6	4	6	27	100
% of Grand Total	0	21	2	2	2	10	37
% of Pa. Entrants[f]	0	47	300	100	75	82	59
Combined	0	91	4	4	7	31	137
% of Column Total	-	100	100	100	100	100	100
% of Row Total	0	66	3	3	5	23	100
% of Grand Total	0	66	3	3	5	23	100
V. All Physicians Who Entered Practice in Pennsylvania[g]							
Pennsylvania	3	163	73	46	42	398	725
% of Column Total	60	69	53	49	50	46	51
% of Row Total	1	22	10	6	6	55	100
% of Grand Total	0	12	5	3	3	28	51
% of 1961-63 Grads[b]	0	8	4	2	2	19	35

Table 6
(continued)

V. All Physicians Who Entered Practice in Pennsylvania[g] (continued)

Where Trained	Family Practice	General Practice	Internal Medicine	Pediatrics	General Surgery	Other Specialty	Total
Other States	1	59	42	26	18	223	369
% of Column Total	20	25	30	28	21	26	26
% of Row Total	1	16	11	7	5	60	100
% of Grand Total	0	4	3	2	1	16	26
% of Pa. Entrants[c]	33	36	58	57	43	56	51
Foreign	1	13	24	21	25	240	324
% of Column Total	20	6	17	23	29	28	23
% of Row Total	0	4	7	7	8	74	100
% of Grand Total	0	1	2	1	2	17	23
% of Pa. Entrants[c]	33	8	33	46	60	60	45
Combined	5	235	139	93	85	861	1,418
% of Column Total	100	100	100	100	100	100	100
% of Row Total	0	17	10	6	6	61	100
% of Grand Total	0	17	10	6	6	61	100

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[a] All numerical data in the table is based upon AMA tape records, circa Nov. 26, 1971, or upon the 1971 Directory of the American Osteopathic Association (Appendix B).

[b] During the years 1961-63, 2,079 degrees were awarded by the medical schools of Pennsylvania, 1,872 M.D. and 207 D.O. degrees. These figures are used throughout this table.

[c] Figures obtained by dividing the figure for this section by the number of 1961-63 Pennsylvania entrants in the first section to get a ratio estimate in percentage terms.

[d] Based upon data from the 1971 Directory of the American Osteopathic Association.

[e] During the years 1961-63, 2,079 degrees were awarded by the medical schools of Pennsylvania of which 207 were doctor of osteopathy degrees.

[f] The figures here are obtained by dividing the number of Pennsylvania entrants above (line 1) into the number of entrants from out-of-state medical schools in the United States.

[g] Derived by summation of data in preceding tables.

(Section III), doctors of osteopathy entrants (Section IV) and all physician entrants combined (Section V). Table 6 also contains data on graduates of 1961-63 from Pennsylvania medical schools, out-of-state medical schools, foreign medical schools and all medical schools combined.

The per cent of column total figure indicates the proportion in that speciality among the 1961-63 categories coming from Pennsylvania medical schools, out-of-state medical schools or foreign medical schools, e.g., 69 per cent of the general practitioners either retained or imported were Pennsylvania trained, 25 per cent were trained in other states and 6 per cent were trained by a foreign medical school (Section V of Table 6). The per cent of row total gives the proportion of all physicians from the medical schools of a given region (Pennsylvania, out-of-state, foreign), e.g., of the Pennsylvania trained 1961-63 graduates 1 per cent entered family practice, 22 per cent entered general practice, 10 per cent became practitioners of internal medicine, 6 per cent became pediatricians, 6 per cent became general surgeons and 55 per cent entered into other areas of specialization. The per cent of the grand total figure, on the other hand, represents the overall proportion of all 1961-63 graduates in the state as of November 26, 1971 approximately, e.g., 12 per cent of all 1961-63 graduates practicing in the State of Pennsylvania in 1971 were in general practice.

Obviously, the numbers in the state and the proportions cited above will not give us the retention rates needed. What is required is a comparison between the number of Pennsylvania graduates (1961-63) retained and the number of graduates produced during this period. The row *per cent of 1961-63 grads* therefore, reflects Pennsylvania's ability to retain graduates in each specialty area given in Table 6.

Overall, Table 6 indicates that we retained 35 per cent of our graduates of 1961-63, 8 per cent in general or family practice, 4 per cent in internal medicine, 2 per cent in pediatrics, 2 per cent in general surgery and 19 per cent in other specialty areas. If this data is generalizable, then 8 per cent, for example, of our 1970 graduates could be expected to remain or return to Pennsylvania as independent practitioners of family medicine or as general practitioners.

Information on the number of 1961-63 out-of-state graduates attracted to the state by 1971 is likewise of no value of itself. Records indicate that the 22,656 U.S. medical school graduates (Table 83 of reference 1) minus the 2,079 Pennsylvania graduates (Appendix D) of 1961-63 give us a total graduate out-of-state 1961-63 output of 20,577 physicians. Of this total, for example, one or 0.005 per cent became practitioners of family medicine in Pennsylvania by 1971, 0.29 per cent became general practitioners, 0.27 became internists, 0.13 per cent pediatricians, 0.09 per cent general surgeons and 1.08 per cent entered other specialties. Overall, Pennsylvania had attracted 1.79 per cent of all out-of-state 1961-63 graduates (based on data from Section V of Table 6).

Such percentage figures could be derived for all of the sections of Table 6 simply by dividing the numerical *other states* entry by 20,577. Unfortunately, projections of other state graduate output growth were not available. As a result, a different approach had to be adopted in Table 6. This consisted of determining the ratio (in percentage terms) of the Pennsylvania retainees to the out-of-state trained entrants (per cent of Pennsylvania entrants), e.g., the one family practice out-of-state trained entrant (Section V, Table 6) was 33 per cent of the number of Pennsylvania trained retainees[3]. Similarly, the number of general practice entrants from out-of-state medical schools was 36 per cent. The same principle was used with regard to the foreign trained entrants. Use of these ratios for projection purposes will, of course, require an assumption of no change in the relative proportion of Pennsylvania trained to out-of-state or foreign trained entrants.

Projections of Pennsylvania Trained Supply

Tables 7 and 8 are an attempt to project the supply of Pennsylvania trained physicians under one or two conditions. Table 7 projects the supply based upon the historical trend of the 1960s using linear correlation as the basis of the projection. Table 8, on the other hand, projects the supply of Pennsylvania trained physicians based upon the proposed or projected growth made by the eight medical schools in response to the survey (Appendix D) made by the author. Both tables assume that the rates of retention found in Table 6 will be equally true of the 1970s.

Based on historical trend only (Table 7), we would be producing 835 graduates in 1980 and would retain 293 of these as practicing physicians with 264 in direct patient care. If the medical schools are able to grow as anticipated (Table 4), they will be graduating some 1,340 graduates in 1980, 474 of whom will remain as practicing physicians and 430 of them in direct patient care.

Table 7

Projected Supply of Pennsylvania Medical School Graduates Who Will Remain to Practice in the State of Pennsylvania if the Medical Schools Expand Only at Their Historic Rate and No Change in Retention of Graduates Occurs

Year	Projected M.D. Graduates[a]	Projected M.D. Supply[b]	Projected D.O. Graduates[c]	Projected D.O. Supply[d]	Total Projected Pa. Supply[e]	Cumulated Total Pa. Supply[e]
1971	673	229(202)	90	38	267(240)	267(240)
1972	679	231(204)	92	39	270(243)	537(483)
1973	685	233(206)	94	39	272(245)	809(728)
1974	691	235(207)	96	40	275(247)	1,084(975)
1975	696	237(209)	98	41	278(250)	1,362(1,225)
1976	702	239(211)	100	42	281(253)	1,643(1,478)
1977	708	241(212)	102	43	284(255)	1,927(1,733)
1978	714	243(214)	104	44	287(258)	2,214(1,991)
1979	720	245(216)	107	45	290(261)	2,504(2,252)
1980	726	247(218)	109	46	293(264)	2,797(2,516)

[a] A linear projection based upon the 1961-1971 historical data found in Table 4.

[b] Based upon the finding in Table 6 that 34 per cent of those graduating as M.D.'s during the years 1961-63 remained in Pennsylvania as practicing physicians (30 per cent as direct care physicians, i.e., see figures in parentheses).

[c] A linear projection based upon the 1961-1971 osteopathic graduate data found in Table 4.

[d] Based upon the finding in Table 6 that 42 per cent of those graduating as doctors of osteopathy from the Philadelphia College of Osteopathic Medicine during the years 1961-63 remained in Pennsylvania as practicing direct care physicians. Total remaining is virtually identical with those in direct care.

[e] Direct patient care supply from Pennsylvania's medical schools in parentheses.

Table 8

Projected Supply of Pennsylvania Medical School Graduates Who Will Remain to Practice in the State of Pennsylvania if the Medical Schools Expand as Planned and Retention Rates Remain Unchanged

Year	Projected M.D. Graduates[a]	Projected M.D. Supply[b]	Projected D.O. Graduates[c]	Projected D.O. Supply[d]	Total Projected Pa. Supply[e]	Cumulated Total Pa. Supply[e]
1971	741	252 (222)	106	45	297 (267)	297 (267)
1972	810	275 (243)	125	53	328 (296)	625 (563)
1973	826	281 (248)	137	58	339 (306)	964 (869)
1974	883	300 (265)	148	62	362 (327)	1,326, (1,196)
1975	902	307 (271)	151	63	370 (334)	1,696 (1,530)
1976	973	331 (292)	170	71	402 (363)	2,098 (1,893)
1977	1,007	342 (302)	189	79	421 (381)	2,519 (2,274)
1978	1,052	358 (316)	212	89	447 (405)	2,966 (2,679)
1979	1,084	369 (325)	236	99	468 (424)	3,434 (3,105)
1980	1,104	375 (331)	236	99	474 (430)	3,908 (3,533)

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[a] See survey based projections by Pennsylvania's medical schools in Table 4.

[b] Based upon the finding in Table 6 that 34 per cent of those graduating as M.D.'s during the years 1961-63 remained in Pennsylvania as practicing physicians (30 per cent as direct care physicians, i.e., see figures in parentheses).

[c] See survey based projections by the Philadelphia College of Osteopathic Medicine in Table 4.

[d] Based upon the finding in Table 6 that 42 per cent of those graduating as doctors of osteopathy from the Philadelphia College of Osteopathic Medicine during the years 1961-63 remained in Pennsylvania as practicing direct care physicians. Total remaining is virtually identical with those in direct care.

[e] Direct patient care supply from Pennsylvania's medical schools in parentheses.

Table 9 through 13 represent similar projections of supply for the speciality areas of general practice, internal medicine, pediatrics, general surgery and other specialty areas combined. The methodology used here is exactly the same as for Tables 7 and 8.

Taken as a whole, Tables 8 through 13 indicate that from 1971 to 1980 Pennsylvania will have produced and retained 3,908 practicing physicians. Of these, 1,076 will be in general practice, 390 in internal medicine, 204 in pediatrics, 223 in general surgery and 2,116 in other specialties. The detailed figures for the specialties add up to a figure of 4,009 which is higher than the general projection of 3,908 by a figure of 101. This discrepancy is due to the rounding of percentage figures in Table 6 and represents a discrepancy of some 10 physicians per year which may be considered as negligible for the purposes of this study.

Medical Origin of Pennsylvania M.D.'s

Table 14 is based upon the data found in the AMA roster tapes for Pennsylvania as of November 26, 1971 and summarizes the medical education origins of Pennsylvania's physicians. Looking at the data we see that of the 19,205 Pennsylvania physicians listed by the AMA as of November 26, 1971, 15,925 were trained in the United States (82.92 per cent), 14 were trained in Puerto Rico (0.07 per cent) and 3,266 were trained in foreign medical schools (17.01 per cent).

Furthermore, we see in Table 14 that 58.31 per cent of Pennsylvania's physicians were trained in Pennsylvania (a much higher figure than the retention rate of 35 per cent for the 1960s). Of Pennsylvania's medical physicians trained in the medical schools of the United States, 70.32 per cent were trained in Pennsylvania. The states or areas that have provided the most physicians are New York State and the District of Columbia. New York trained physicians represent 4.87 per cent, of all of Pennsylvania's medical physicians 5,88 per cent of the Pennsylvania medical physicians trained in the United States and 19.8 per cent of the in-migrating medical physicians trained in other states of the Union.

Of the foreign-trained medical physicians, the largest number came from Asia (1,285) with Europe (952) running second. Of the Pennsylvania medical physicians 6.69 per cent are Asian trained and 4.96 per cent are European trained. Asia contributed 39.18 per cent and Europe 29.02 per cent of the foreign-trained medical physicians in Pennsylvania. All told, the undeveloped nations of Asia, Africa, the Middle East and South America have provided Pennsylvania with 10.64 per cent of the state's medical physicians and 62.84 per cent of all of the foreign-trained medical physicians residing in the state as of November 26, 1971. Pennsylvania, furthermore, had at that time approximately one foreign-trained physician out of every six (17.01 per cent). This figure matches exactly with the findings of the HEW report^5 mentioned earlier in which one out of six (16.67 per cent) U.S. physicians was trained in a foreign medical school.

In-migration

Obviously, there is a substantial influx of physicians from outside of the state. The problem is how to determine the amount of in-migration and derive a rate figure that can be used to project the supply due to in-migration.

Ideally the licensure boards could provide precise figures on physicians newly located as practitioners in Pennsylvania but, the current data recording process used by the boards makes such data difficult to obtain. (See Chapter VI)

As a consequence, an alternative approach was used. It consisted of taking a 10 per cent sample (every 10th medical physician) of the physicians listed in the **1969 Director of Physicians**, published annually by the AMA, and then determining how many of them were not in the state in 1967 using the 1967 director of the AMA. The numbers arrived at were corrected to estimate the total number that in-migrated by multiplying the sample figure by 10. These estimates were further corrected to arrive at a yearly in-migration figure by dividing by two–the interval between directories. The resulting figures are somewhat low since doctors of osteopathy are not included. They can, however, be used as a basis for estimates of the impact of in-migration upon supply.

The findings are summarized in Table 15 where we see, for example, that 70 general practice medical physicians are estimated to have entered the state each year based upon a sample count of 14, i.e., 14 x 20 ÷ 2 = 70. Ten of the general practitioners were Pennsylvania-trained medical physicians who returned from another state. Fifteen were Pennsylvania-trained general practitioners who returned from the armed forces, 10 medical physicians entered the state following training in another state, 10 came both from military service to practice in Pennsylvania even though trained

Table 9

Projected Supply of Pennsylvania Medical School Graduates Who Will Remain in the State of Pennsylvania as General or Family Practitioners if the Medical Schools Expand as Planned and Retention Rates Remain Unchanged

Year	Projected M.D. Graduates[a]	Projected M.D. Supply[b]	Projected D.O. Graduates[c]	Projected D.O. Supply[d]	Total Projected Pa. Supply	Cumulated Total Pa. Supply
1971	741	44	106	32	76	76
1972	810	49	125	38	87	163
1973	826	50	137	41	91	254
1974	883	53	148	44	97	351
1975	902	54	151	45	99	450
1976	973	58	170	51	109	559
1977	1,007	60	189	57	117	676
1978	1,052	63	212	64	127	803
1979	1,084	65	236	71	136	939
1980	1,104	66	236	71	137	1,076

[a] See survey based projections by Pennsylvania's medical schools in Table 4.

[b] Based upon the finding in Table 6 that six per cent of those graduating as M.D.'s during the years 1961-63 remained in Pennsylvania as general or family practitioners.

[c] See survey based projections by the Philadelphia College of Osteopathic Medicine in Table 4.

[d] Based upon the finding in Table 6 that 30 per cent of those graduating as doctors of osteopathy from the Philadelphia College of Osteopathic Medicine during the years 1961-63 remained in Pennsylvania as general or family practitioners. Total remaining is virtually identical with those in direct care.

Table 10

Projected Supply of Pennsylvania Medical School Graduates Who Will Remain in the State of Pennsylvania as Practitioners of Internal Medicine if the Medical Schools Expand as Planned and Retention Rates Remain Unchanged

Year	Projected M.D. Graduates[a]	Projected M.D. Supply[b]	Projected D.O. Graduates[c]	Projected D.O. Supply[d]	Total Projected Pa. Supply[e]	Cumulated Total Pa. Supply[e]
1971	741	30 (22)	106	1	31 (23)	31 (23)
1972	810	32 (24)	125	1	33 (25)	64 (48)
1973	826	33 (25)	137	1	34 (26)	98 (74)
1974	883	35 (26)	148	1	36 (27)	134 (101)
1975	902	36 (27)	151	2	38 (29)	172 (130)
1976	973	39 (29)	170	2	41 (31)	213 (161)
1977	1,007	40 (30)	189	2	42 (32)	255 (193)
1978	1,052	42 (32)	212	2	44 (34)	299 (227)
1979	1,084	43 (33)	236	2	45 (35)	344 (262)
1980	1,104	44 (33)	236	2	46 (35)	390 (297)

[a] See survey based projections by Pennsylvania's medical schools in Table 4.

[b] Based upon the finding in Table 6 that four per cent of those graduating as M.D.'s during the years 1961-63 remained in Pennsylvania as internists (three per cent as direct care physicians, i.e., see figures in parentheses).

[c] See survey based projections by the Philadelphia College of Osteopathic Medicine in Table 4.

[d] Based upon the finding in Table 6 that one per cent of those graduating as doctors of osteopathy from the Philadelphia College of Osteopathic Medicine during the years 1961-63 remained in Pennsylvania as internists. Total remaining is virtually identical with those in direct care.

[e] Direct patient care supply from Pennsylvania's medical schools in parentheses.

Table 11

Projected Supply of Pennsylvania Medical School Graduates Who Will Remain in the State of Pennsylvania as Pediatricians if the Medical Schools Expand as Planned and Retention Rates Remain Unchanged

Year	Projected M.D. Graduates[a]	Projected M.D. Supply[b]	Projected D.O. Graduates[c]	Projected D.O. Supply[d]	Total Projected Pa. Supply	Cumulated Total Pa. Supply
1971	741	15	106	1	16	16
1972	810	16	125	1	17	33
1973	826	17	137	1	18	51
1974	883	18	148	1	19	70
1975	902	18	151	2	20	90
1976	973	19	170	2	21	111
1977	1,007	20	189	2	22	133
1978	1,052	21	212	2	23	156
1979	1,084	22	236	2	24	180
1980	1,104	22	236	2	24	204

[a] See survey based projections by Pennsylvania's medical schools in Table 4.

[b] Based upon the finding in Table 6 that two per cent of those graduating as M.D.'s during the years 1961-63 remained in Pennsylvania as pediatricians.

[c] See survey based projections by the Philadelphia College of Osteopathic Medicine in Table 4.

[d] Based upon the finding in Table 6 that one per cent of those graduating as doctors of osteopathy from the Philadelphia College of Osteopathic Medicine during the years 1961-63 remained in Pennsylvania as pediatricians. Total remaining is virtually identical with those in direct care.

Table 12

Projected Supply of Pennsylvania Medical School Graduates Who Will Remain in the State of Pennsylvania as General Surgeons if the Medical Schools Expand as Planned and Retention Rates Remain Unchanged

Year	Projected M.D. Graduates[a]	Projected M.D. Supply[b]	Projected D.O. Graduates[c]	Projected D.O. Supply[d]	Total Projected Pa. Supply	Cumulated Total Pa. Supply
1971	741	15	106	2	17	17
1972	810	16	125	3	19	36
1973	826	17	137	3	20	56
1974	883	18	148	3	21	77
1975	902	18	151	3	21	98
1976	973	19	170	3	22	120
1977	1,007	20	189	4	24	144
1978	1,052	21	212	4	25	169
1979	1,084	22	236	5	27	196
1980	1,104	22	236	5	27	223

[a] See survey based projections by Pennsylvania's medical schools in Table 4.

[b] Based upon the finding in Table 6 that two per cent of those graduating as M.D.'s during the years 1961-63 remained in Pennsylvania as general surgeons.

[c] See survey based projections by the Philadelphia College of Osteopathic Medicine in Table 4.

[d] Based upon the finding in Table 6 that two per cent of those graduating as doctors of osteopathy from the Philadelphia College of Osteopathic Medicine during the years 1961-63 remained in Pennsylvania as general surgeons. Total remaining is virtually identical with those in direct care.

Table 13

Projected Supply of Pennsylvania Medical School Graduates Who Will Remain in the State of Pennsylvania as Specialists in Areas Other Than General Practice, Family Practice, Internal Medicine, Pediatrics or General Surgery if the Medical Schools Expand as Planned and Retention Rates Remain Unchanged

Year	Projected M.D. Graduates[a]	Projected M.D. Supply[b]	Projected D.O. Graduates[c]	Projected D.O. Supply[d]	Total Projected Pa. Supply[e]	Cumulated Total Pa. Supply[e]
1971	741	148 (126)	106	15	163 (141)	163 (141)
1972	810	162 (138)	125	18	180 (156)	343 (297
1973	826	165 (140)	137	19	184 (159)	527 (456)
1974	883	177 (150)	148	21	198 (171)	725 (627)
1975	902	180 (153)	151	21	201 (174)	926 (807)
1976	973	195 (165)	170	24	219 (189)	1,145 (990)
1977	1,007	201 (171)	189	26	227 (197)	1,372 (1,187)
1978	1,052	210 (179)	212	30	240 (209)	1,612 (1,396)
1979	1,084	217 (184)	236	33	250 (217)	1,862 (1,613)
1980	1,104	221 (188)	236	33	254 (221)	2,116 (1,834)

[a] See survey based projections by Pennsylvania's medical schools in Table 4.

[b] Based upon finding in Table 6 that 20 per cent of those graduating as M.D.'s during the years 1961-63 remained in Pennsylvania as practicing physicians in other specialties (17 per cent as direct care physicians, i.e., see figures in parentheses).

[c] See survey based projections by the Philadelphia College of Osteopathic Medicine in Table 4.

[d] Based upon the finding in Table 6 that 14 per cent of those graduating as doctors of osteopathy from the Philadelphia College of Osteopathic Medicine during the years 1961-63 remained in Pennsylvania as specialists in other areas than those tabled.

[e] Direct patient care supply from Pennsylvania's medical schools in parentheses.

Table 14

Location of Medical Education for 19,205 Pennsylvania (M.D.) Physicians (November 26, 1971)[a]

Location	Number	Percentage of All Pennsylvania M.D.'s	Percentage of U.S. Trained Pa.M.D.'s	Percentage M.D.'s Trained in Other States Than Pa.
I. U.S. Trained Pennsylvania M.D.'s				
Alabama	12	0.06	0.08	0.25
*Alaska	-	-	-	-
Arizona	-	-	-	-
Arkansas	15	0.08	0.09	0.32
California	97	0.50	0.61	2.05
Colorado	12	0.06	0.08	0.25
Connecticut	80	0.42	0.50	1.69
Delaware	-	-	-	-
District of Columbia	632	3.29	3.97	13.37
Florida	21	0.11	0.13	0.44
Georgia	40	0.21	0.25	0.85
*Hawaii	-	-	-	-
*Idaho	-	-	-	-
Illinois	384	2.00	2.41	8.13
Indiana	55	0.29	0.34	1.16
Iowa	55	0.29	0.34	1.16
Kansas	21	0.11	0.13	0.44
Kentucky	54	0.28	0.34	1.14
Louisiana	57	0.30	0.36	1.21
Maine	-	0.00	0.00	0.00
Maryland	448	2.33	2.81	9.48
Massachusetts	357	1.86	2.24	7.55
Michigan	138	0.72	0.87	2.92
Minnesota	49	0.25	0.31	1.04
Mississippi	2	0.01	0.01	0.04
Missouri	188	0.98	1.18	3.98
*Montana	-	0.00	0.00	0.00
Nebraska	62	0.32	0.39	1.31
Nevada	-	0.00	0.00	0.00
New Hampshire	-	0.00	0.00	0.00
New Jersey	50	0.26	0.31	1.06
New Mexico	1	0.01	0.01	0.02
New York	936	4.87	5.88	19.80
North Carolina	113	0.59	0.71	2.39
North Dakota	-	-	0.00	0.00
Ohio	244	1.27	1.53	5.16
Oklahoma	21	0.11	0.13	0.44
Oregon	13	0.07	0.08	0.27
Pennsylvania	11,199	58.31	70.32	-
Rhode Island	-	-	0.00	0.00
South Carolina	17	0.09	0.11	0.36
South Dakota	-	-	0.00	0.00
Tennessee	148	0.77	0.93	3.13
Texas	50	0.26	0.31	1.06
Utah	11	0.06	0.07	0.23
Vermont	54	0.28	0.34	1.14
Virginia	134	0.70	0.84	2.83
Washington	13	0.07	0.08	0.27
West Virginia	42	0.22	0.26	0.89
Wisconsin	100	0.52	0.63	2.12
*Wyoming	-	-	0.00	0.00
U.S.A.	15,925	82.92	100.00	-

Table 14
(contd.)

Location	Number	Percentage of All Pennsylvania M.D.'s	Percentage of 3,280 Foreign & U.S. Possession Trained M.D.'s
II. Pennsylvania M.D.'s Trained in U.S. Possessions and Territories			
*Canal Zone	-		0.00
*Guam	-		0.00
Puerto Rico	14	0.07	0.43
*Samoa	-	-	0.00
*Virgin Islands	-	-	0.00
Total	14	0.07	0.43
III. Pennsylvania M.D.'s Trained in Foreign Medical Schools			
A. Europe	952	4.96	29.02
B. Middle East	347	1.81	10.58
C. Asia	1,285	6.69	39.18
D. Canada	230	1.20	7.01
E. South America	412	2.14	12.56
F. Africa (S. Africa)	17	0.09	0.52
G. Other (Australia & New Zealand)	23	0.12	0.70
Total	3,266	17.01	99.57

[a]Data compiled from AMA tapes dated November 26, 1971.

*Indicates no medical school in this state.

Table 15

A Summary of In-migration Estimates Derived From Original Counts Based on a 10 Per Cent Sample of All M.D.'s in the 1969 Directory of the American Medical Association[a]

	Place Received Medical Education			
Source	Pennsylvania	Other States	Foreign	Total
I. General Practice				
Another State	10(2)[b]	10(2)	10(2)	30(6)
Armed Forces	15(3)	10(2)		25(5)
Another Country			15(3)	15(3)
All Sources	25(5)	20(4)	25(5)	70(14)
II. Internal Medicine				
Another State	10(2)[b]	5(1)		15(3)
Armed Forces	10(2)	5(1)		15(3)
Government Service	10(2)			10(2)
Another Country			15(3)	15(3)
All Sources	30(6)	10(2)	15(3)	55(11)
III. Pediatrics				
Another State	15(3)[b]			15(3)
Armed Forces	10(2)			10(2)
All Sources	25(5)			25(5)
IV. General Surgery				
Another State	10(2)[b]	10(2)	5(1)	25(5)
Armed Forces	10(2)	5(1)		15(3)
Government Service	5(1)			5(1)
Another Country			10(2)	10(2)
All Sources	25(5)	15(3)	15(3)	55(11)
V. Other Specialties				
Another State	50(10)[b]	35(7)	25(2)	110(22)
Armed Forces	40(8)	10(2)		50(10)
Temp. Foreign Residence	5(1)			5(1)
Government Service	10(2)	10(2)		20(4)
Another Country			40(8)	40(8)
All Sources	105(21)	55(11)	65(13)	225(45)
VI. All Active Direct Care M.D.'s Combined				
Another State	95(19)[b]	60(12)	40(8)	195(39)
Armed Forces	85(17)	30(6)		115(23)
Temp. Foreign Res.	5(1)			5(1)
Government Service	25(5)	10(2)		35(7)
Another Country			80(16)	80(16)
All Sources	210(42)	100(20)	120(24)	430(86)

Table 15

(Continued)

Source	Place Received Medical Education			
	Pennsylvania	Other States	Foreign	Total
VII. Active M.D.'s Not in Direct Patient Care				
Another State	5(1)[b]	45(9)	5(1)	55(11)
Armed Forces		10(2)		10(2)
Temp. Foreign Res.		5(1)		5(1)
Government Service	5(1)	15(3)		20(4)
Another Country			15(3)	15(3)
All Sources	10(2)	75(15)	20(4)	105(21)
VIII. All Active M.D.'s Combined				
Another State	100(20)[b]	105(21)	45(9)	250(50)
Armed Forces	85(17)	40(8)		125(25)
Temp. Foreign Res.	5(1)	5(1)		10(2)
Government Service	30(6)	25(5)		55(11)
Another Country			95(19)	95(19)
All Sources	220(44)	175(35)	140(28)	535(107)
IX. Residents[c]				
Another State	55(11)[b]	20(4)	75(15)	150(30)
Armed Forces	60(12)	60(12)		120(24)
Temp. Foreign Res.	5(1)		5(1)	10(2)
Government Service	10(2)	5(1)		15(3)
Another Country			220(44)	220(44)
All Sources	130(26)	85(17)	300(60)	515(103)

X. Not Previously Listed But U.S. Trained

Category	Pennsylvania	Other States	Total
Active	105(21)	35(7)	140(28)
Residents	160(32)	105(21)	265(53)
Total	265(53)	140(28)	405(81)

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[a] Names from a 10 per cent sample of the physicians listed in the 1969 AMA Directory were compared against the 1967 AMA Directory listings. Those listed as residing elsewhere or not listed in 1967 were recorded as possible in-migrants.

[b] The number in parentheses represents the sample count, while the number in front represents the estimated number if the total population had been studied. The figure is further corrected to give an estimate of the number entering in 1968 only, i.e., if the entry were 25(5), the number 25 was obtained as follows: (5) x 10 ÷ 2.

[c] No attempt has been made to summarize the data for interns since they are largely not listed in 1967. Resident data is given as a matter of interest but is not used as a basis for estimating replacement.

in another state, 10 foreign-trained medical physicians came from another state of the Union and 15 foreign-trained medical physicians came directly from a foreign country. The data in Table 15 represents practicing physicians only and does not list interns. Residents are separately analyzed.

Correction Factors for Out-of-State Supply

Since medical schools are expanding and the numbers in-migrating must, of necessity, grow larger with time, these figures (Table 15) cannot be used as they are without a resulting underestimation of future supply due to in-migration. Rough correction factors based upon data in Tables 4, 6 and 15 were, therefore, developed. These correction factors are to be found in Tables 16 to 21 of this report.

In these tables, we have two separate estimates of physician entry (medical physician) from medical schools of Pennsylvania, other states and foreign countries. The first estimate is an estimate of physician retention and in-migration from the percentage retained and percentage ratios of Table 6. The entry of 225 for the column *Estimated 1968 Pennsylvania Trained Supply* is derived from the figure of 34 per cent retention of medical physicians in Section III of Table 6 times the number of medical physician graduates in 1968 from Table 4,i.e., 751 - 900 D.O. graduates = 661 medical physician graduates.

The entry of 113 for the second column (*Other State Trained Supply*) is also derived from Tables 6 by using the ratio (in percentage terms) of other state trained entrants to Pennsylvania retainees and multiplying it times the figure in column 1, i.e., .50 times 225 = 113 (Table 6, Section III). The same procedure was used to estimate the *Foreign-Trained Supply* figure of Tables 16-21, e.g., .51 times 225 - 115 (Table 6, Section III). The second (Table 15 based) row of data consists of figures taken directly from Table 15 concerning active and direct care physician in-migration estimates for 1968 (halfway between 1967 and 1969).

The estimation factors are based upon simple assumptions that the larger of the two estimates will tend to be correct. Also, that the *Pennsylvania Trained* figures will be very similar while the Table 6 based retention figures will be an underestimate due to the restriction of Table 6 to 1961-63 graduates only. Obviously, graduates of other years than 1961-63 are likely to enter the state as active full-time practitioners rather than residents or interns which are not included here.

Final Projections of Physician Supply

Tables 22a and 22b contain the final estimates of active and direct care physician supply based upon the foregoing tables of this chapter.

Projections of graduates from Tables 7 and 8 are found in columns 1 and 2. Uncorrected estimates of the supply of medical physicians and doctors of osteopathy using the retention and ratio figures of Table 6 times the values in columns 1 and 2 are found in columns 3 through 6, i.e., the appropriate retention figure on Table 6 times the appropriate graduate output figure in this table or the uncorrected supply estimate of columns 3 or 4 times the appropriate ratio figure of Table 6.

Since these figures in columns 3 to 6 are based on the 1961-63 graduate data figures of Table 6 they must then be converted to figures comparable to those of Table 15. This has been done by taking the estimation factors of Tables 16 to 21 times the appropriate values in columns 2 to 6 which give estimates of the yearly supply of physicians (medical physician or doctor of osteopathy) from medical schools in Pennsylvania and from all out-of-state sources. Active and direct patient care, in parentheses, estimates are given for each category of physician. The final column is a summation or total of the supply from all sources for a given year, e.g., in 1980 approximately 1,056 active physicians, other than residents or interns, will have begun practice in Pennsylvania and between 1971 and 1980 8,793 physicians will have done so.

The net migration effect is likely to be a relatively small figure since Pennsylvania also exports many physicians. This out-migration is an aspect of the demand side of the equation and will be dealt with later. Suffice it to say here that **the data of Tables 15 and 61 of this report indicate a net physician migration pattern that favors Pennsylvania by a margin of 120 (Table 63) active physicians per year.**

No discussion of Table 22b is required since it uses the same procedure but starts with the historical past (1963-1970) based linear projection of graduates in Table 7. The result is a projected supply lower than that obtained in Table 22a where cohorted class estimate procedures and first year projections by the medical schools were the basis of the projections.

The supply projections from Table 22a will be used later to interface estimates of supply with estimates of physician demand in order to make projections of physician need.

Table 16

Computation of 1968 Based Correction (Per Cent) Factors for Estimating the Other State Trained and Foreign Trained Medical School Supply of All M.D.'s in Active or Direct Care

Data Base	Estimated 1968 Pennsylvania Trained Supply	Estimated 1968 Other State Trained Supply	Estimated Foreign Trained Supply
Table 6	226 (198)[a]	113 (85)[c]	115 (87)[e]
Table 15	220 (210)[b]	175 (100)[d]	140 (120)[f]
Estimation Factor	100%(106%)[g]	155%(118%)	122%(138%)

[a] Represents the finding of Table 6 that 34 per cent of the 1961-63 M.D. graduates (N - 1,872) of Pennsylvania's medical schools remained in the state in 1971 as active physicians and that 30 per cent remained as direct care physicians, i.e., 0.34 x the 661 graduates of 1968 = 225 and 0.30 x 661 = 198.

[b] The figures are taken directly from Table 15 with the figures in parentheses representing direct care physicians and the first figure representing the in-migration of active physicians in 1968.

[c] Computed from Table 6 using 50 per cent and 43 per cent of the Pennsylvania entrants for the active and direct care estimates, i.e., 0.50 x 225 = 113 and 0.43 x 198 = 85.

[d] The figures are taken directly from Table 15 with the figure in parentheses representing direct care physicians and the first figure representing the in-migration of active physicians in 1968.

[e] Computed from Table 6 using 51 per cent and 44 per cent of the Pennsylvania supply of active and direct care M.D.'s, i.e., 0.51 x 225 = 115 and 0.44 x 198 = 87.

[f] Figures taken directly from the direct and active care data of Table 15.

[g] Assumes the larger of the estimates to be correct, i.e., 225 over 220 or 210 over 198.

Table 17

Computation of 1968 Based Correction (Per Cent) Factors for Estimating the Other State Trained and Foreign Trained Medical School Supply of All M.D.'s in General and Family Practice

Data Base	Estimated 1968 Pennsylvania Trained Supply	Estimated 1968 Other State Trained Supply	Estimated 1968 Foreign Trained Supply
Table 6	40 (40)[a]	12 (12)[c]	6 (5)[e]
Table 15	25 (25)[b]	20 (20)[d]	25 (25)[f]
Estimation Factor	100%(100%)[g]	167%(167%)	417%(500%)

[a] Represents the finding of Table 6 that six per cent of the 1961-63 M.D. graduates (N - 1,872) of Pennsylvania's medical schools remained in the state as active physicians and that the figure of six per cent applies also to those in direct care, i.e., all active general practitioners were in direct care. The proportion 0.06 times the 661 students who graduated in 1968 therefore equals 40 for both direct and active general practitioners.

[b] The figure in parentheses represents the Table 15 direct care estimate of in-migrating general practitioners in 1968 and since the total number of in-migrating active physicians not in direct care was 10, as compared with 210 in direct care (Table 15), it is assumed that the same pattern as for Table 6 holds here, i.e., all active general practitioners are in fact direct care practitioners.

[c] Computed from Table 6 using 30 per cent and 29 per cent of the Pennsylvania supply for the active and direct care estimates, i.e., 0.30 times 40 equals 12 and 0.29 times 40 equals 12.

[d] Assumes that all active general practitioners are direct care general practitioners and takes the direct care figure directly from Table 15.

[e] Computed from Table 6 using 14 per cent and 13 per cent of the Pennsylvania supply for the active and direct care estimates, i.e., 0.14 times 40 equals 6 and 0.13 times 40 equals 5.

[f] The direct care estimate is taken directly from Table 15 with all active general practitioners assumed to be direct care M.D.'s.

[g] The larger of the two estimates is assumed to be correct, e.g., 40 over 25.

Table 18

Computation of 1968 Based Correction (Per Cent) Factors for Estimating the Other State Trained and Foreign Trained Medical School Supply of M.D.'s in Internal Medicine

Data Base	Estimated 1968 Pennsylvania Trained Supply	Estimated 1968 Other State Trained Supply	Estimated 1968 Foreign Trained Supply
Table 6	26 (20)[a]	14 (9)[c]	9 (5)[e]
Table 15	31 (30)[b]	18 (10)[d]	18 (15)[f]
Estimation Factor	115%(150%)	129%(111%)	200%(300%)

[a] Represents the finding of Table 6 that four per cent of the 1961-63 M.D. graduates (N - 1,872) of Pennsylvania's medical schools remained in the state as active physicians, e.g., for 1968, 4 per cent of the 661 M.D. graduates of 1968 would be 26. The figure in parentheses represents direct care and is based on a figure of three per cent, e.g., 661 x 0.03 = 20.

[b] The figure in parentheses is taken directly from Table 15 and represents the 1968 estimate of the in-migration of Pennsylvania trained M.D.'s in direct care practice. The active physician in-migration estimate is 31 and is arrived at by using the ratio of all active physicians to all direct care physicians times the number of direct care physicians in internal medicine, i.e., 220 ÷ 210 = 1.0476 and 30 x 1.0476 = 31.

[c] Computed from Table 6 but using percentage figures of 54 per cent and (43 per cent) for active and direct care internists, respectively, i.e., 0.54 times 26 equals 14 and 0.43 x 20 = 9.

[d] Figure in parentheses taken directly from the direct care 1968 in-migration estimate of Table 15. The active physician estimate is computed from Table 15 as in note b, above, i.e., 175 ÷ 100 = 1.75 and 1.75 x 10 direct care in-migrants is 18.

[e] Computed from Table 6 as in note c, above, but using percentages of 33 per cent and 26 per cent to compute the active and direct care figures, respectively.

[f] The figure in the parentheses is taken directly form the direct care 1968 in-migration estimate of Table 15. The active physician estimate is computed from Table 15 as in notes b and d, above, i.e., 140 ÷ 120 = 1.1667 and 1.1667 x 15 = 18.

Table 19

Computation of 1968 Based Correction (Per Cent) Factors for Estimating the Other State Trained and Foreign Trained Medical School Supply of M.D.'s in Pediatrics

Data Base	Estimated 1968 Pennsylvania Trained Supply	Estimated 1968 Other State Trained Supply	Estimated 1968 Foreign Trained Supply
Table 6	16 (14)[a]	9((7)[c]	8 (6)[e]
Table 15	26 (25)[b]	0 (0)[d]	0 (0)[f]
Estimation Factor	163%(179%)	100%(100%)[g]	100%(100%)[g]

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[a] Represents the finding of Table 6 that 2.35 per cent of the 1961-63 M.D. graduates (N - 1,872) of Pennsylvania's medical schools remained in the state as active physicians and 2.14 per cent as direct care physicians. e.g., for 1968, 2.35 per cent of the 661 M.D. graduates would be 16 and 2.14 per cent of 661 would be 14.

[b] The figure in the parentheses is taken directly from Table 15 and represents the 1968 estimate of the in-migration of Pennsylvania trained pediatricians (M.D.) in direct care. The active physician estimate is based upon the use of the overall ratio of active to direct care physicians from Table 15, i.e., 220 active ÷ 210 direct care = 1.0476 x 1.0476 = 26.

[c] Computed from Table 6 using percentage figures of 55 per cent and 53 per cent for active and direct care pediatricians, respectively, e.g., 0.55 x 16 = 9 and 0.53 x 14 = 7.

[d] Figure in parentheses taken directly from the 1968 direct care in-migration estimate of Table 14. The active physician estimate is computed from Table 15 as in note b, above, but cannot have any value other than zero since the number of direct care physicians is estimated as zero.

[e] Computed from Table 6 as in note c, above, but using 47.7 per cent and 45.0 per cent for active and direct care physicians, respectively.

[f] The figure in parentheses is taken directly from the direct care 1968 in-migration estimates of Table 15 and the value of the active care value is therefore zero since the direct care estimate was zero.

[g] The larger of the two estimates is assumed to be correct.

Table 20

Computation of 1968 Based Correction (Per Cent) Factors for Estimating the Other State Trained and Foreign Trained Medical School Supply of All M.D.'s in General Surgery

Data Base	Estimated 1968 Pennsylvania Trained Supply	Estimated 1968 Other State Trained Supply	Estimated 1968 Foreign Trained Supply
Table 6	13 (13)[a]	5 (5)[c]	9 (8)[e]
Table 15	26 (25)[b]	16 (15)[d]	18 (15)[f]
Estimation Factor	200%(192%)	320%(300%)	200%(188%)

[a] Represents the finding of Table 6 that two per cent of the 1961-63 M.D. graduates (N - 1,872) of Pennsylvania medical schools remained in the state as active physicians and these two per cent were all direct care physicians, e.g., that two per cent of the 661 graduates of 1968 equals 13.

[b] The figure in parentheses is taken directly from Table 15 and represents the 1968 estimate of the in-migration of Pennsylvania's trained general surgeons (M.D.) in direct care. The active physician estimate is based upon the ratio of active to direct care physicians in the state, i.e., 220 active ÷ 210 direct care = 1.0476 and 1.0476 x 15 is 26.

[c] Computed from Table 6 using 39 per cent and 37 per cent for the active and direct care estimates, e.g., 0.39 x 13 = 5 and 0.37 x 13 = 5.

[d] Figure in parentheses taken directly from the 1968 direct care in-migration estimate of Table 15. The active physician estimate is computed from Table 15 as in note b, above, i.e., 175 ÷ 100 = 1.75 and 1.75 x 15 = 26.

[e] Computed from Table 6 as in note c, above, but using 65.8 per cent and 57.9 per cent for active and direct care estimates, respectively, e.g., 0.658 x 13 = 9 and 0.579 x 13 = 8.

[f] The direct care figure in parentheses is taken from Table 15. The active care figure is obtained from Table 15 as in notes b and d, above, i.e., 140 ÷ 120 = 1.1667 and 1.1667 x 15 = 18.

Table 21

Computation of 1968 Based Correction (Per Cent) Factors for Estimating the Other State Trained and Foreign Trained Medical School Supply of All M.D.'s in Other Specialties

Data Base	Estimated 1968 Pennsylvania Trained Supply	Estimated 1968 Other State Trained Supply	Estimated 1968 Foreign Trained Supply
Table 6	132(112)[a]	73 (53)[c]	83 (62)[e]
Table 15	110(105)[b]	96 (55)[d]	76 (65)[f]
Estimation Factor	100%(100%)[g]	132%(104%)	100%(105%)[g]

[a] Represents the finding of Table 6 that 20 per cent of the 1961-63 M.D. graduates (N - 1,872) of Pennsylvania's medical schools remained in the state as active physicians and that 17 per cent of the graduates remained as direct care physicians, i.e., 0.20 x 661 = 132.

[b] The figure in parentheses represents direct care in-migration from Table 15. The active care count is obtained by use of the ratio between active and direct care physicians overall, i.e., 220 ÷ 210 = 1.0476 and 1.0476 x 105 = 110.

[c] Computed from Table 6 using 55 per cent and 47 per cent of the Pennsylvania supply for the active and direct care estimates, e.g., 0.55 x 132 = 73 and 0.47 x 112 = 53.

[d] The direct care figure in parentheses is taken from Table 15. The active physician (1968) in-migration estimate is computed from Table 15 as in note b, above, i.e, 175 active M.D.'s ÷ 100 direct care M.D.'s = 1.75 and 1.75 x 55 = 96.

[e] Computed from Table 6 as in note c, above, but using 63 per cent and 55 per cent for the active and direct care estimates, respectively, e.g., 0.63 x 132 = 83 and 0.55 x 112 = 62.

[f] The direct care figure in parentheses is taken directly from Table 15. The active care figure is obtained from Table 15 as in notes b and d, above, i.e., 140 ÷ 120 = 1.1667 and 1.1667 x 65 = 76.

[g] Assumes the larger of the two estimates to be correct, ie., 83 over 76 and 65 over 62.

Table 22a

Survey Based Projections of Active and Direct Care Physician Supply

All Active or Direct Care Physicians

Year	Projected Medical School M.D. Grads.[a]	Projected Medical School D.O. Grads.[a]	Uncorrected Estimates of Pa. Trained M.D.Supply[b]	Uncorrected Estimates of Pa. Trained D.O.Supply[b]	Uncorrected Estimates of Other State Trained M.D.Supply[c]	Uncorrected Estimates of Other State Trained D.O.Supply[c]	Uncorrected Estimates of Foreign Trained M.D.Supply[d]	Final Estimate of Pa. Trained M.D. Supply[e]	Final Estimate of Pa. Trained D.O. Supply[f]	Final Estimate of Other State Trained M.D.Supply[e]	Final Estimate of Other State Trained D.O. Supply[f]	Final Estimate of Foreign Trained M.D. Supply[c]	Projected Yearly Supply of Active Physicians
1971	741	106	252(222)	45	126(86)	27	129(98)	252(235)	45	195(102)	27	157(135)	676(544)
1972	810	125	275(243)	53	138(105)	31	140(107)	275(258)	53	214(124)	31	171(148)	744(614)
1973	826	137	281(248)	58	141(107)	34	143(109)	281(263)	58	219(126)	34	174(150)	766(631)
1974	883	148	300(265)	62	150(114)	37	153(117)	300(281)	62	233(135)	37	187(161)	819(676)
1975	902	151	307(271)	63	154(117)	37	157(119)	307(287)	63	239(138)	37	192(164)	838(689)
1976	973	170	331(292)	71	166(126)	42	169(129)	331(310)	71	257(149)	42	206(178)	907(750)
1977	1,007	189	342(302)	79	171(130)	47	174(133)	342(320)	79	265(153)	47	212(184)	945(783)
1978	1,052	212	358(316)	89	179(136)	53	183(139)	358(335)	89	277(160)	53	223(192)	1,000(829)
1979	1,084	236	369(325)	99	185(140)	58	188(143)	369(345)	99	287(165)	58	229(197)	1,042(864)
1980	1,104	236	375(331)	99	188(142)	58	191(146)	375(351)	99	291(168)	58	233(201)	1,056(877)
Total	9,382	1,710	3,190(2,815)	718	1,598(1,203)	424	1,627(1,240)	3,190(2,985)	718	2,477(1,420)	424	1,984(1,710)	8,793(7,257)
General or Family Practice													
1971	741	106	44(44)	32	13(13)	15	6(6)	44(44)	32	22(22)	15	25(25)*	138(138)
1972	810	125	49(49)	38	15(14)	18	6(6)	49(49)	38	25(23)	18	25(25)	155(153)
1973	826	137	50(50)	41	15(15)	19	7(7)	50(50)	41	25(25)	19	29(29)	164(164)
1974	883	148	53(53)	44	16(15)	21	7(7)	53(53)	44	27(25)	21	29(29)	174(172)
1975	902	151	54(54)	45	16(16)	21	7(7)	54(54)	45	27(27)	21	29(29)	176(176)
1976	973	170	58(58)	51	17(17)	24	8(8)	58(58)	51	28(28)	24	33(33)	194(194)
1977	1,007	189	60(60)	57	18(17)	27	8(8)	60(60)	57	30(28)	27	33(33)	207(205)
1978	1,052	212	63(63)	64	19(18)	30	8(8)	63(63)	64	32(30)	30	33(33)	222(220)
1979	1,084	236	65(65)	71	20(19)	33	8(8)	65(65)	71	33(32)	33	33(33)	235(234)
1980	1,104	236	66(66)	71	20(19)	33	9(9)	66(66)	71	33(32)	33	38(38)	241(240)
Total	9,382	1,710	562(562)	514	165(163)	241	74(74)	562(562)	514	282(272)	241	307(307)	1,906(1,896)
Internal Medicine													
1971	741	106	30(22)	1	16(9)	3	10(6)	35(33)	1	21(10)	3	20(18)	80(65)
1972	810	125	32(24)	1	17(10)	3	11(7)	37(36)	1	22(11)	3	22(21)	85(72)
1973	826	137	33(25)	1	18(11)	3	11(7)	38(38)	1	23(12)	3	22(21)	87(75)
1974	883	148	35(26)	1	19(11)	3	12(8)	40(39)	1	25(12)	3	24(24)	93(79)
1975	902	151	36(27)	2	19(12)	6	12(8)	41(41)	2	25(13)	6	24(24)	98(86)
1976	973	170	39(29)	2	21(12)	6	13(8)	45(45)	2	27(13)	6	26(24)	106(90)
1977	1,007	189	40(30)	2	22(13)	6	13(9)	46(45)	2	28(14)	6	26(26)*	108(93)
1978	1,052	212	42(32)	2	23(14)	6	14(9)	48(48)	2	30(16)	6	28(27)	114(99)
1979	1,084	236	43(33)	2	23(14)	6	14(10)	49(49)*	2	30(16)	6	28(28)*	115(101)
1980	1,104	236	44(33)	2	24(14)	6	15(10)	51(50)	2	31(16)	6	30(30)	120(104)
Total	9,382	1,710	374(281)	16	202(120)	48	125(82)	430(424)	16	262(133)	48	250(243)	1,006(864)
Pediatrics													
1971	741	106	15(15)	1	8(8)	3	7(7)	24(24)*	1	8(8)	3	7(7)	43(43)
1972	810	125	16(16)	1	9(8)	3	8(7)	26(26)*	1	9(8)	3	8(7)	47(45)
1973	826	137	17(17)	1	9(9)	3	8(8)	28(28)*	1	9(9)	3	8(8)	49(49)
1974	883	148	18(18)	1	10(10)	3	9(8)	29(29)*	1	10(10)	3	9(8)	52(51)
1975	902	151	18(18)	2	10(10)	6	9(8)	29(29)*	2	10(10)	6	9(8)	56(55)
1976	973	170	19(19)	2	10(10)	6	9(9)	31(31)*	2	10(10)	6	9(9)	58(58)
1977	1,007	189	20(20)	2	11(11)	6	10(9)	33(33)*	2	11(11)	6	10(9)	62(61)
1978	1,052	212	21(21)	2	12(11)	6	10(9)	34(34)*	2	12(11)	6	10(9)	64(62)
1979	1,084	236	22(22)	2	12(12)	6	11(10)	36(36)*	2	12(12)	6	11(10)	67(66)
1980	1,104	236	22(22)	2	12(12)	6	11(10)	36(36)*	2	12(12)	6	11(10)	67(66)
Total	9,382	1,710	188(188)	16	103(101)	48	92(85)	306(306)*	16	103(101)	48	92(85)	565(556)

Table 22a (Continued)

General Surgery

Year	Projected Medical School M.D. Grads.[a]	Projected Medical School D.O. Grads.[a]	Uncorrected Estimates of Pa. Trained M.D. Supply[b]	Uncorrected Estimates of Pa. Trained D.O. Supply[b]	Uncorrected Estimates of Other State Trained M.D. Supply[c]	Uncorrected Estimates of Other State Trained D.O. Supply[c]	Uncorrected Estimates of Foreign Trained M.D. Supply[d]	Final Estimate of Pa. Trained M.D. Supply[e]	Final Estimate of Pa. Trained D.O. Supply[f]	Final Estimate of Other State Trained M.D. Supply[e]	Final Estimate of Other State Trained D.O. Supply[f]	Final Estimate of Foreign Trained M.D. Supply[e]	Projected Yearly Supply of Active Physicians
1971	741	106	15(15)	2	6(6)	2	10(9)	30(29)	2	19(18)	2	20(17)	73(68)
1972	810	125	16(16)	3	6(6)	2	11(9)	32(31)	3	19(18)	2	22(17)	78(71)
1973	826	137	17(17)	3	7(6)	2	11(10)	34(33)	3	22(18)	2	22(19)	83(75)
1974	883	148	18(18)	3	7(7)	2	12(10)	36(35)	3	22(21)	2	24(19)	87(80)
1975	902	151	18(18)	3	7(7)	2	12(10)	36(35)	3	22(21)	2	24(19)	87(80)
1976	973	170	19(19)	3	7(7)	2	13(11)	38(36)	3	22(21)	2	26(21)	91(83)
1977	1,007	189	20(20)	4	8(8)	3	13(12)	40(38)	4	26(24)	3	26(23)	99(92)
1978	1,052	212	21(21)	4	8(8)	3	14(12)	42(40)	4	26(24)	3	28(23)	103(94)
1979	1,084	236	22(22)	5	9(8)	4	15(13)	44(42)	5	29(24)	4	30(24)	112(99)
1980	1,104	236	22(22)	5	9(8)	4	15(13)	44(42)	5	29(24)	4	30(24)	112(99)
Total	9,382	1,710	188(188)	35	74(71)	26	126(109)	376(361)	35	236(213)	26	252(206)	925(841)
							Other Specialties						
1971	741	106	148(126)	8	81(59)	7	93(69)	148(126)	8	107(61)	7	93(72)	363(274)
1972	810	125	162(138)	10	89(65)	8	102(76)	162(138)	10	117(68)	8	102(80)	399(304)
1973	826	137	165(140)	11	91(66)	9	104(77)	165(140)	11	120(69)	9	104(81)	409(310)
1974	883	148	177(150)	12	97(71)	10	112(83)	177(150)	12	128(74)	10	112(87)	439(333)
1975	902	151	180(153)	12	99(72)	10	113(84)	180(153)	12	131(75)	10	113(88)	446(338)
1976	973	170	195(165)	14	107(78)	11	123(91)	195(165)	14	141(81)	11	123(96)	484(367)
1977	1,007	189	201(171)	15	111(80)	12	127(94)	201(171)	15	147(83)	12	127(99)	502(380)
1978	1,052	212	210(179)	17	116(84)	14	132(98)	210(179)	17	153(87)	14	132(103)	526(400)
1979	1,084	236	217(184)	19	119(86)	16	137(101)	217(184)	19	157(89)	16	137(106)	546(414)
1980	1,104	236	221(188)	19	122(88)	16	139(103)	221(188)	19	161(92)	16	139(108)	556(423)
Total	9,382	1,710	1,876(1,594)	137	1,032(749)	113	1,182(876)	1,876(1,594)	137	1,362(779)	113	1,182(920)	4,670(3,543)

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*Whenever the direct care estimate exceeds the active physician estimate the direct care total is reduced to equality with the active physician estimates.

[a] From Table 4, i.e., projection of Pennsylvania graduates.

[b] Table 6 percentages of 1961-63 graduates retained as active or direct care physicians in this specialty area in Pennsylvania times the projected graduate output of either column 1 or 2 of this table.

[c] Percentage ratio of out-of-state entrants to Pennsylvania trained retainees (See Table 6) times the appropriate estimated Pennsylvania supply figure computed as in note b above and entered into columns 4 and 5 of the table.

[d] Percentage ratio of foreign trained entrants to Pennsylvania trained retainees (See Table 6) times the appropriate estimated Pennsylvania supply figure of columns 4 or 5 above.

[e] Uses the estimation factors of Tables 16-21 times their corresponding uncorrected estimates in this table, i.e., times the data of columns 4, 6 and 8 of this table.

[f] A 10 per cent sampling of the 1971 American Osteopathic Association Directory listings for Pennsylvania when compared with 1967 listings for these physicians yield no evidence for in-migration of active or direct care D.O.'s. The uncorrected estimates of columns 5 and 7 were therefore accepted as the best available estimate.

Table 22b

Historical Trend Based Projections of Active and Direct Care Physician Supply

All Active or Direct Care Physicians

Year	Historical M.D. Graduate Projection[a]	Historical D.O. Graduate Projection[a]	Uncorrected Estimate Pa. Trained M.D.Supply[b]	Uncorrected Estimate Pa. Trained D.O.Supply[b]	Uncorrected Estimate Other State Trained M.D.Supply[c]	Uncorrected Estimate Other State Trained D.O.Supply[c]	Uncorrected Estimate Foreign Trained M.D. Supply[d]	Corrected Pa. Trained M.D. Supply[e]	Corrected Pa. Trained D.O. Supply[f]	Corrected Other State Trained M.D. Supply[e]	Corrected Other State Trained D.O. Supply[f]	Corrected Foreign Trained M.D. Supply[e]	Projected Yearly Supply of Active Physicians
1971	673	90	229(202)	38	115(87)	22	117(89)	229(214)	38	178(103)	22	143(123)	610(500)
1972	679	92	231(204)	39	116(88)	23	118(90)	231(216)	39	180(104)	23	144(124)	617(506)
1973	685	94	233(206)	39	117(89)	23	119(91)	233(218)	39	181(105)	23	145(126)	621(511)
1974	691	96	235(207)	40	118(89)	24	120(91)	235(219)	40	183(105)	24	146(126)	628(514)
1975	696	98	237(209)	41	119(90)	24	121(92)	237(222)	41	184(106)	24	148(127)	634(520)
1976	702	100	239(211)	42	120(91)	25	122(93)	239(224)	42	186(107)	25	149(128)	641(526)
1977	708	102	241(212)	43	121(91)	25	123(93)	241(225)	43	188(107)	25	150(128)	647(528)
1978	714	104	243(214)	44	122(92)	26	124(94)	243(227)	44	189(109)	26	151(130)	653(536)
1979	720	106	245(216)	45	123(93)	27	125(95)	245(229)	45	191(110)	27	153(131)	661(542)
1980	726	109	247(218)	46	124(94)	27	126(96)	247(231)	46	192(111)	27	154(132)	666(547)
Total	6,994	991	2,380(2,099)	417	1,195(904)	246	1,215(924)	2,380(2,225)	417	1,852(1,067)	246	1,483(1,275)	6,378(5,230)
							General or Family Practice						
1971	673	90	40(40)	27	12(12)	13	5(5)	40(40)	27	20(20)	13	20(20)*	120(120)
1972	679	92	41(41)	28	12(12)	13	5(5)	41(41)	28	20(20)	13	20(20)	122(122)
1973	685	94	41(41)	28	12(12)	13	5(5)	41(41)	28	20(20)	13	20(20)	122(122)
1974	691	96	41(41)	29	12(12)	14	5(5)	41(41)	29	20(20)	14	20(20)	124(124)
1975	696	98	42(42)	29	13(12)	14	5(5)	42(42)	29	22(20)	14	20(20)	127(125)
1976	702	100	42(42)	30	13(12)	14	5(5)	42(42)	30	22(20)	14	22(20)	128(126)
1977	708	102	42(42)	31	13(12)	15	5(5)	42(42)	31	22(20)	15	20(20)	130(128)
1978	714	104	43(43)	31	13(12)	15	6(6)	43(43)	31	22(20)	15	24(24)	135(133)
1979	720	106	43(43)	32	13(12)	15	6(6)	43(43)	32	22(20)	15	24(24)	136(134)
1980	726	109	44(44)	33	13(13)	16	6(6)	44(44)	33	22(22)	16	24(24)	139(139)
Total	6,994	991	419(419)	298	126(121)	142	53(53)	419(419)	298	212(202)	142	212(212)	1,283(1,273)
							Internal Medicine						
1971	673	90	27(26)	1	15(11)	3	9(8)	31(31)	1	19(12)	3	18(18)*	72(65)
1972	679	92	27(26)	1	15(11)	3	9(8)	31(31)	1	19(12)	3	18(18)	72(65)
1973	685	94	27(27)	1	15(12)	3	9(8)	31(31)	1	19(13)	3	18(18)	72(66)
1974	691	96	28(27)	1	15(12)	3	9(8)	32(32)	1	19(13)	3	18(18)	73(67)
1975	696	98	28(27)	1	15(12)	3	9(8)	32(32)	1	19(13)	3	18(18)	73(67)
1976	702	100	28(27)	1	15(12)	3	9(8)	32(32)	1	19(13)	3	18(18)	73(67)
1977	708	102	28(28)	1	15(12)	3	9(8)	32(32)	1	19(13)	3	18(18)	73(67)
1978	714	104	29(28)	1	16(12)	3	10(8)	33(33)	1	21(13)	3	20(20)	78(70)
1979	720	106	29(28)	1	16(12)	3	10(8)	33(33)	1	21(13)	3	20(20)	78(70)
1980	726	109	29(28)	1	16(12)	3	10(8)	33(33)	1	21(13)	3	20(20)	78(70)
Total	6,994	991	280(272)	10	153(118)	30	93(80)	320(320)	10	196(128)	30	186(186)	742(674)
							Pediatrics						
1971	673	90	13(13)	1	7(7)	1	6(6)	21(21)	1	7(7)	1	6(6)	36(36)
1972	679	92	14(14)	1	8(8)	1	7(6)	23(23)	1	8(8)	1	7(6)	40(39)
1973	685	94	14(14)	1	8(8)	1	7(6)	23(23)	1	8(8)	1	7(6)	40(39)
1974	691	96	14(14)	1	8(8)	1	7(6)	23(23)	1	8(8)	1	7(6)	40(39)
1975	696	98	14(14)	1	8(8)	1	7(6)	23(23)	1	8(8)	1	7(6)	40(39)
1976	702	100	14(14)	1	8(8)	1	7(6)	23(23)	1	8(8)	1	7(6)	40(39)
1977	708	102	14(14)	1	8(8)	1	7(6)	23(23)	1	8(8)	1	7(6)	40(39)
1978	714	104	14(14)	1	8(8)	1	7(6)	23(23)	1	8(8)	1	7(6)	40(39)
1979	720	106	14(14)	1	8(8)	1	7(6)	23(23)	1	8(8)	1	7(6)	40(39)
1980	726	109	15(15)	1	8(8)	1	7(7)	24(24)	1	8(8)	1	7(7)	41(41)
Total	6,994	991	140(140)	10	79(79)	10	69(61)	229(229)	10	79(79)	10	69(61)	397(359)

Table 22b (continued)

General Surgery

Year	Historical M.D. Graduate Projection[a]	Historical D.O. Graduate Projection[a]	Uncorrected Estimate Pa. Trained M.D. Supply[b]	Uncorrected Estimate Pa. Trained D.O. Supply[b]	Uncorrected Estimate Other State Trained M.D. Supply[c]	Uncorrected Estimate Other State Trained D.O. Supply[c]	Uncorrected Estimate Foreign Trained M.D. Supply[d]	Corrected Pa. Trained M.D. Supply[e]	Corrected Pa. Trained D.O. Supply[f]	Corrected Other State Trained M.D. Supply[e]	Corrected Other State Trained D.O. Supply[f]	Corrected Foreign Trained M.D. Supply[e]	Projected Yearly Supply of Active Physicians
1971	673	90	13(13)	2	5(5)	2	9(8)	26(25)	2	16(15)	2	18(14)	64(59)
1972	679	92	14(14)	2	5(5)	2	9(8)	28(27)	2	16(15)	2	18(15)	66(61)
1973	685	94	14(14)	2	5(5)	2	9(8)	28(27)	2	16(15)	2	18(15)	66(61)
1974	691	96	14(14)	2	5(5)	2	9(8)	28(27)	2	16(15)	2	18(15)	66(61)
1975	696	98	14(14)	2	5(5)	2	9(8)	28(27)	2	16(15)	2	18(15)	66(61)
1976	702	100	14(14)	2	5(5)	2	9(8)	28(27)	2	16(15)	2	18(15)	66(61)
1977	708	102	14(14)	2	5(5)	2	9(8)	28(27)	2	16(15)	2	18(15)	66(61)
1978	714	104	14(14)	2	5(5)	2	9(8)	28(27)	2	16(15)	2	18(15)	66(61)
1979	720	106	14(14)	2	5(3)	2	9(8)	28(27)	2	16(15)	2	18(15)	66(61)
1980	726	109	15(15)	2	6(6)	2	10(9)	30(29)	2	19(18)	2	20(17)	73(68)
Total	6,994	991	140(140)	20	51(51)	20	91(81)	280(270)	20	163(153)	20	182(152)	665(615)

Other Specialties

Year	Historical M.D. Graduate Projection[a]	Historical D.O. Graduate Projection[a]	Uncorrected Estimate Pa. Trained M.D. Supply[b]	Uncorrected Estimate Pa. Trained D.O. Supply[b]	Uncorrected Estimate Other State Trained M.D. Supply[c]	Uncorrected Estimate Other State Trained D.O. Supply[c]	Uncorrected Estimate Foreign Trained M.D. Supply[d]	Corrected Pa. Trained M.D. Supply[e]	Corrected Pa. Trained D.O. Supply[f]	Corrected Other State Trained M.D. Supply[e]	Corrected Other State Trained D.O. Supply[f]	Corrected Foreign Trained M.D. Supply[e]	Projected Yearly Supply of Active Physicians
1971	673	90	135(114)	7	74(54)	6	85(63)	135(114)	7	98(56)	6	85(66)	331(249)
1972	679	92	136(115)	7	75(54)	6	86(63)	136(115)	7	99(56)	6	86(66)	334(250)
1973	685	94	1 7(116)	8	75(55)	7	86(64)	137(116)	8	99(57)	7	86(67)	337(255)
1974	691	96	138(117)	8	76(55)	7	87(64)	138(117)	8	100(57)	7	87(67)	340(256)
1975	696	98	139(118)	8	76(55)	7	88(65)	139(118)	8	100(57)	7	88(68)	342(258)
1976	702	100	140(119)	8	77(56)	7	88(66)	140(119)	8	102(58)	7	88(69)	345(261)
1977	708	102	142(120)	8	78(56)	7	89(66)	142(120)	8	103(58)	7	89(69)	349(262)
1978	714	104	143(121)	8	79(57)	7	90(67)	143(121)	8	104(59)	7	90(70)	352(265)
1979	720	106	144(122)	8	79(57)	7	91(67)	144(122)	8	104(59)	7	91(70)	354(266)
1980	726	109	145(123)	9	80(58)	7	91(68)	145(123)	9	106(60)	7	91(71)	358(270)
Total	6,994	991	1,399(1,185)	79	769(557)	68	881(653)	1,399(1,185)	79	1,015(577)	68	881(683)	3,442(2,592)

[a] Wherever the direct care estimate would exceed the active care estimate as in this column the direct care value was reduced to equality with the active care estimate.

[a] From Table 7, i.e., historical trend based projections of Pennsylvania graduates.

[b] Table 6 percentages of 1961-63 graduates retained as active or direct care physicians in this specialty area in Pennsylvania times the projected graduate output of either column 1 or 2 of this table.

[c] Percentage ratio of out-of-state entrants to Pennsylvania trained retainees (See Table 6) times the appropriate estimated Pennsylvania supply figure computed as in note b above and entered into columns 4 and 5 of the table.

[d] Percentage ratio of foreign trained entrants to Pennsylvania trained retainees (See Table 6) times the appropriate estimated Pennsylvania supply figure of columns 4 or 5 above.

[e] Uses the estimation factors of Tables 18-23 times their corresponding uncorrected estimates in this table, i.e., times the data of columns 4, 6 and 8 of this table.

[f] A 10 per cent sampling of the 1971 American Osteopathic Association Directory listings for Pennsylvania when compared with 1967 listings for these physicians yield no evidence for in-migration of active or direct care D.O.'s. The uncorrected estimates of columns 5 and 7 were therefore accepted as the best available estimate.

Supply and Physician Income

The supply of physicians is partly controlled by the availability of places for first year medical students in our medical schools. This is a function of the money made available to permit expansion of facilities and faculty for this purpose, but the degree of student demand for medical education and the consequent pressure to meet that need cannot be ignored.

It is apparent that, currently, we are not beginning to meet that demand. In January of 1971 **The Chronicle of Higher Education** reported that 35,000 medical school applicants were competing for 13,000 openings[8] and reports of Americans taking medical training in Mexico and elsewhere are constantly being published.[9]

Furthermore, there is evidence that an interest in medicine as a career is increasing among college students. A survey of 188,900 freshmen at 373 institutions carried out by the American Council on Education[10] indicates that college freshmen interested in medicine have, since 1966, increased from 4.8 per cent of the freshmen sampled to 5.5 per cent in 1972. During the same period, the proportions for other professions such as college teacher (1.8 per cent to 0.6 per cent), teacher of secondary education (14.1 per cent of 6.5 per cent), elementary education (7.6 per cent to 5.6 per cent) and engineer (8.9 per cent to 5.3 per cent) have decreased. Only law (3.9 per cent to 4.7 per cent) and auxiliary health professions (4.7 per cent to 7.3 per cent) have increased in emphasis during this period. The number of applicants to medical school in 1975 would be smaller than these figures would imply since slightly more than half of the freshmen interested in medicine will attrite by the senior year.

Interest in medicine, as in many other professions, is to a significant degree a function of the perceived income of the professionals as seen by the student who is deciding upon a career. Freeman,[11] for example, has emphasized the importance of perceived income in addition to interest in the work per se. He suggests therefore, that salaries, in the long run, have a greater effect in controlling entrance or applicant rates than the size of available stipends for majors in the profession.

If we accept this principle, then the increase in net income for physicians becomes a matter of interest as an indicator of future demand for admission to medical education. It also reflects a possible physician shortage due to the operation of the supply and demand principle.

Table 23 summarizes physician net income data from the journal **Medical Economics**. Historical data is shown for the years 1959-1969 with projections to 1980. A hiatus of relatively static net income is postulated for the years 1971-73 due to probable continuation or reimposition of wage-price control during this period. If such controls are not forthcoming, the linear projections of the growth in net income during the 1960s would have given the 1980 figure of Table 23 as the figures for 1977. The conclusions would be the same, in any case, i.e., applicant pressures for admission to medical school are likely to rise if only because of the impact of the perceived monetary status of the physician. As Freeman[11] shows in his Table 11.6, medicine, law and business are perceived by students as having the highest incomes near retirement with medicine unequivocally the highest after 15 years' experience.

Pennsylvania Medical School Applicants

Tables 24 to 26 of this report are an attempt to summarize some of the data on applicant patterns derived from the survey of Pennsylvania medical schools carried out for this study.

Table 24 lists the total number of applications, not applicants, submitted to the medical schools of Pennsylvania during the years 1963-64 to 1971-72. Where available it gives data concerning the number and per cent of applications from residents of Pennsylvania. It indicates the number of students actually admitted and the number and percentage of admittees who were Pennsylvania residents at the time of admission. **In general, between 59 per cent and 69 per cent of the first year classes have been Pennsylvanians (median 65.5 per cent) over the last decade.**

Table 25 indicates the difference between the various medical schools of Pennsylvania regarding applicant and first year entry data in 1970-71. For example, an applicant for admission has a better chance of being accepted and admitted at the Philadelphia College of Osteopathic Medicine (20.5 per cent of appliants) while those applying for admission to the new, and still small, Hershey Medical School have the least chance of admission (2.8 per cent of applicants are accepted and admitted).

The data in Table 25 are not aggregated since the total number of applications would not be equivalent to the total number of applicants. It seems likely that many of the applicants applied to more than one Pennsylvania medical school but data on this point is

Table 23

Physician Net Income Projections and Historical Values, 1959-1980[a]

Actual[b]

Year	All M.D.'s	General Practice	Internal Medicine	Pediatrics	Obstetrics-Gynecology	General Surgery
1959	22,100	20,000	22,300	20,700	27,900	27,900
1964	28,380	24,420	25,580	24,490	28,400	31,540
1965	28,960	25,090	27,730	25,240	30,520	32,510[c]
1966	32,170	27,720	32,290	28,110	33,940	35,560
1967	34,730	31,370	32,530	27,600	37,380	37,690
1968	37,620	32,990	38,840	32,950	39,720	40,740
1969	40,550	35,140	38,350	34,430	43,770	42,960
			Projected[d]			
1970	43,385	38,265	42,280	39,890	46,495	45,460
1971	Est. Wage Freeze Period					
1972	"	"	"	"		
1973	"	"	"	"		
1974	46,270	40,900	45,190	42,820	49,690	48,050
1975	49,155	43,535	48,100	45,750	52,885	50,640
1976	52,040	46,170	51,010	48,680	56,080	53,230
1977	54,925	48,805	53,820	51,610	59,275	55,820
1978	57,810	51,440	56,830	54,540	62,470	58,410
1979	60,695	54,075	59,740	57,470	65,665	61,000
1980	63,580	56,710	62,650	60,400	68,860	63,590

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[a] It should be noted that the projected growth in net income may not be forthcoming since some specialties are nearly at their maximum capacity to handle patients using present delivery methods and also some are nearing the point of having a surplus of physicians, e.g., general surgery and obstetrics and gynecology. The table does reflect that the demand for services has been great or net income would not have risen so sharply, i.e., the law of supply and demand has been operating.

[b] Data from Medical Economics representing median net income before taxes for active patient care physicians under 65 years of age. Data is reproduced by permission of the Medical Economics Company. Copyright (c) 1971 by Medical Economics Company, Oradell, N. J. 07675.

[c] To keep even with inflation in 1972 the physician would have had to increase his income in 1965 by 39 per cent according to an article in U.S. News and World Report, October 2, 1972, p. 19, i.e., he would need a net income of 40,254 rather than the projected income of 45,460.

[d] Projections based upon an average increment arrived at by determining the median value of successive two-year averages from 1965 through 1969 and subjecting these values to a linear correlation to obtain regression equations. Two-year averages were used to reduce regular year to year fluctuations in growth. The 1974 figures are actually figures for 1971 but a freeze period has been assumed.

Table 24

A Summary of Pennsylvania Medical School Applicant and Admissions Patterns from 1963-64 to 1971-72[a]

School Year	Total Applications	Pennsylvania Applications	Per Cent of Applications from Pa. Residents	Number Admitted First Year Class	Pennsylvanians Admitted First Year Class	Per Cent of First Year Class from Pennsylvania
1963-64	7,872	*[b]	*[b]	806	542	67%
1964-65	9,700	*	*	812	525	65%
1965-66	*[b]	*	*	806	*[b]	-
1966-67	9,735	*	*	815	477	59%
1967-68	*	*	*	898	563	63%
1968-69	13,703	*	*	929	610	66%
1969-70	15,303	*	*	988	632	64%
1970-71	17,283	5,568	32%	961	667	69%
1971-72	19,014	6,333	33%	1,088	731	67%
Percentage Change	+142%	+13%[c]	-	+35%	+35%	-

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[a] Data taken from a survey of the medical schools of Pennsylvania conducted for this report.

[b] Asterisk indicates not all of the medical schools could provide this data.

[c] Represents change from 1970-71 only. Total applications increased by 10 per cent during this one-year period, the number admitted to the first year class increased by 13 per cent and the number of Pennsylvanians admitted to the first year class increased by 10 per cent.

Table 25

1970-71 Applicant Entry Patterns for the Medical Schools of Pennsylvania[a]

School	First-Year Entrants	Applications for Entry	Per Cent Applicants Entering	First-Year Entrants from Pa.	Applicants from Pa.	Per Cent Pa. Applicants Entering	Per Cent First-Year Class Pa. Residents	First-Year Female Entrants	Female Applicants	Per Cent Female Applicants Entering	First-Year Male Entrants	Male Applicants	Per Cent Male Applicants Entering
Hahnemann	118	2,834	4.2	82	1,101	7.4	69.5	14	321	4.4	104	2,513	4.1
Hershey	69	2,461	2.8	38	1,020	3.7	55.1	7	282	2.5	62	2,179	2.8
Jefferson	212	3,339	6.3	158	980	16.1	74.5	26	272	9.6	186	3,067	6.1
Medical College of Pa.	66	727	9.1	26	172	15.1	39.4	60	727	8.3	6	*[c]	-
Philadelphia Osteopathic	152	742	20.5	101	N.A.	-	66.4	3	N.A.	-	149	N.A.	-
Temple	160	2,572	6.2	125	1,065	11.7	78.1	13	219	5.9	147	2,353	6.2
U. Pennsylvania	150	2,690	5.6	46	491	9.4	30.7	18	273	6.6	132	2,199	6.0
U. Pittsburgh	128	1,918	6.7	91	739	12.3	71.1	9	147	6.1	119	1,771	6.7

[a] Data derived from a survey of medical schools in Pennsylvania.

[b] One or two entrants, generally, are repeaters rather than new entrants.

[c] Asterisk indicates the data is anomalous since 66 first year entrants are given with 60 of these female, yet the number of female applicants is equal to the total number of applicants listed. We must presume error or that 6 first year students are repeaters or were not required to formal application procedures.

not available. Nevertheless, the median percentage acceptance of applicants was 6.25 per cent.(Jefferson and Temple were close to the median value; Hahnemann, the University of Pennsylvania and Hershey were low, 4.2 per cent, 5.6 per cent and 2.8 per cent, respectively; while the Medical College of Pennsylvania, the University of Pittsburgh and the Philadelphia College of Osteopathic Medicine were high, 9.1 per cent, 6.7 per cent and 20.5 per cent, respectively.

It is interesting to note that one of the high ranking medical schools was primarily or exclusively a women's medical college during this period. Another one is an osteopathic medical school that trains a large number of family practice (general practice) oriented physicians. Graduation from a school of osteopathic medicine may well be regarded as less acceptable by applicants despite the AMA recognition of osteopathic training as equivalent in kind and quality to that received by doctors of medicine.

The University of Pittsburgh is, on the other hand, the only medical school other than Hershey that is outside of the Philadelphia area and may consequently be less well known to the applicants than the others.

Pennsylvania Applicants

Comparable, but incomplete, applicant entry data for the medical schools of Pennsylvania can also be found in Table 25. Philadelphia College of Osteopathic Medicine data on Pennsylvania applicants were not available. The rank order of the percentage of Pennsylvania applicants accepted was essentially the same as for the percentage of applicants entering with the exception of Jefferson, which ranked first in Pennsylvania applicants accepted but third in acceptance of applicants in general. The median percentage of Pennsylvania applicants accepted and entering was 11.7 per cent, which was substantially better than the overall applicant value of 6.2 per cent for the seven medical schools of Pennsylvania (osteopathy excepted).

Pennsylvania Residents in First Year Class

A perennial question asked by legislators and others is that of what proportion of an entering class can we classify as being residents of Pennsylvania. In Table 25, we find that the proportion of Pennsylvanians in the entering class of 1970-71 was 68.75 per cent (median of eight medical schools) with the actual values ranging from 30.7 per cent for the University of Pennsylvania and 39.4 per cent for the Medical College of Pennsylvania to 78.1 per cent for Temple University School of Medicine, 74.5 per cent for Jefferson Medical School and 71.1 per cent for the University of Pittsburgh. Four of the eight medical schools of Pennsylvania had entering classes with less than 70 per cent Pennsylvania residents and two of these were below 50 per cent.

Male and Female First Year Class Entry

Data regarding applicant and entry data for each sex are also found in Table 25. For the six medical schools able to provide applicant by sex data, the median percentage of male applicants accepted and entering was 6.0 per cent and for the female applicants, 6.0 per cent. A rank ordering of applications by each sex indicates that the male and female applicants entry figures for the six medical schools providing data do not rank in an identical fashion. Inspection of the data suggests that female applicants find it easier to be accepted and to enter Jefferson Medical School and the University of Pennsylvania Medical School.

Historical Applicant Trends

Table 26 summarizes for each Pennsylvania medical school the overall historical trends for Pennsylvania applicants, out-of-state applicants, male applicants, female applicants and applicants in general, i.e., total applicants. The percentage of applicants for admission who are male or female Pennsylvania residents or nonresidents is given in the table breakdown. These percentage figures are given in parentheses following the number of applicants for each school. At the end of each section of the table, average annual percentage increase over the period of time for which data is available is given.

Inspection of Table 26 quickly reveals that the proportion of Pennsylvania residents among the applicants have steadily dropped from the earliest period recorded to the year 1971-72 where we find Hershey Medical School with the highest proportion (per cent) of Pennsylvanians among its applicants (44.3 per cent) and the University of Pennsylvania with the smallest number of Pennsylvania resident applications (22.8 per cent).

In contrast to this deteriorating situation the proportion of female applicants in the applicant population had generally risen to an all time high during this same period. Still, female applicants represent only 11.3 per cent (median of the institutions) of the applicants even now.

Table 26

Historical Trends For Pennsylvania Medical School Applicants[a]

Medical School--Total Applicants

School Year	Hahnemann	Hershey	Jefferson	Med. College Pennsylvania	Philadelphia Osteopathic	Temple	Univ. Penna.	Univ. Pittsburgh
1960-61	N.A.		1,334	N.A.	219	N.A.	1,630	N.A.
1961-62	N.A.		1,252	N.A.	251	N.A.	1,279	630
1962-63	855		1,377	N.A.	275	N.A.	1,383	717
1963-64	1,473		1,739	230	365	1,790	1,475	800
1964-65	1,882		2,322	338	400	2,079	1,757	922
1965-66	1,821		2,144	309	443	N.A.	1,656	1,279
1966-67	1,871		2,037	306	424	2,051	1,682	1,364
1967-68	2,015	1,077	2,308	358	432	N.A.	1,730	1,082
1968-69	2,370	1,906	2,777	350	581	2,471	1,998	1,250
1969-70	2,692	2,163	2,984	379	717	2,488	2,304	1,576
1970-71	2,834	2,461	3,339	727	7[illegible]	2,572	2,690	1,918
1971-72	2,588	2,339	3,194	1,247	9[illegible]	3,471	2,565	2,705
Average Per Cent Growth	22.5	29.3	12.7	55.3	28.6	11.7	5.2	32.9

Medical School--Pennsylvania Applicants

School Year	Hahnemann	Hershey	Jefferson	Med. College Pennsylvania	Philadelphia Osteopathic	Temple	Univ. Penna.	Univ. Pittsburgh
1960-61	N.A.		625(46.9%)	N.A.	N.A.	N.A.	414(25.4%)	N.A.
1961-62	N.A.		602(48.1%)	N.A.	N.A.	N.A.	359(28.1%)	N.A.
1962-63	412(48.1%)[b]		663(48.2%)	N.A.	N.A.	N.A.	455(32.9%)	N.A.
1963-64	689(46.8%)		805(46.3%)	N.A.	N.A.	N.A.	473(32.1%)	N.A.
1964-65	815(43.3%)		890(38.3%)	N.A.	N.A.	N.A.	559(31.8%)	N.A.
1965-66	788(43.3%)		982(45.8%)	N.A.	N.A.	N.A.	490(29.6%)	N.A.
1966-67	724(38.7%)		737(36.2%)	N.A.	N.A.	N.A.	466(27.7%)	N.A.
1967-68	832(41.3%)	560(52.0%)	897(38.9%)	N.A.	N.A.	N.A.	437(25.0%)	N.A.
1968-69	923(38.9%)	905(47.5%)	830(29.9%)	N.A.	N.A.	1,021(41.3%)	504(25.2%)	457(36.6%)
1969-70	1,047(38.9%)	731(33.8%)	915(30.7%)	N.A.	N.A.	1,018(40.9%)	501(21.7%)	620(39.3%)
1970-71	1,101(38.9%)	1,020(41.4%)	9[illegible](29.4%)	172(23.7%)	N.A.	1,065(41.4%)	491(18.3%)	739(38.5%)
1971-72	982(37.9%)	1,037(44.3%)	1,123(35.2%)	420(33.7%)	N.A.	1,224(35.3%)	585(22.8%)	926(34.2%)
Average Per Cent Growth	15.4	21.3	7.2	144.2	N.A.	6.6	3.8	34.2

Medical School--Out-of-State Applicants

School Year	Hahnemann	Hershey	Jefferson	Med. College Pennsylvania	Philadelphia Osteopathic	Temple	Univ. Penna.	Univ. Pittsburgh
1960-61	N.A.		709(53.1%)	N.A.	N.A.	N.A.	1,216(74.6%)	N.A.
1961-62	N.A.		650(51.9%)	N.A.	N.A.	N.A.	920(71.9%)	N.A.
1962-63	443(51.9%)[b]		714(51.8%)	N.A.	N.A.	N.A.	928(67.1%)	N.A.
1963-64	784(53.2%)		934(53.7%)	N.A.	N.A.	N.A.	1,002(67.9%)	N.A.
1964-65	1,067(56.7%)		1,432(61.7%)	N.A.	N.A.	N.A.	1,198(68.2%)	N.A.
1965-66	1,033(56.7%)		1,162(54.2%)	N.A.	N.A.	N.A.	1,166(70.4%)	N.A.
1966-67	1,147(61.3%)		1,300(63.8%)	N.A.	N.A.	N.A.	1,216(72.3%)	N.A.
1967-68	1,183(58.7%)	517(48.0%)	1,411(61.1%)	N.A.	N.A.	N.A.	1,313(75.0%)	N.A.
1968-69	1,447(61.1%)	1,001(52.5%)	1,947(70.1%)	N.A.	N.A.	1,450(58.7%)	1,494(74.8%)	793(63.4%)
1969-70	1,645(61.1%)	1,432(66.2%)	2,069(69.3%)	N.A.	N.A.	1,470(59.1%)	1,803(78.3%)	956(60.7%)
1970-71	1,733(61.1%)	1,441(58.6%)	2,359(70.6%)	555(76.3%)	N.A.	1,507(58.6%)	2,199(81.7%)	1,179(61.5%)
1971-72	1,606(62.1%)	1,302(55.7%)	2,071(64.8%)	827(66.3%)	N.A.	2,247(64.7%)	1,980(77.2%)	1,779(65.8%)
Average Per Cent Growth	29.2	38.0	17.5	49.0	N.A.	18.3	5.7	41.5

Medical School--Female Applicants

School Year	Hahnemann	Hershey	Jefferson	Med. College Pennsylvania	Philadelphia Osteopathic	Temple	Univ. Penna.	Univ. Pittsburgh
1960-61	N.A.		0(0.0%)	N.A.	N.A.	N.A.	93(5.7%)	N.A.
1961-62	N.A.		38(3.0%)	N.A.	N.A.	N.A.	80(6.3%)	45(7.1%)
1962-63	173(20.2%)[b]		35(2.5%)	N.A.	N.A.	N.A.	85(6.2%)	42(5.9%)
1963-64	157(10.7%)		71(4.1%)	230(100.0%)	N.A.	[illegible](9.9%)	122(8.3%)	43(5.4%)
1964-65	190(10.[illegible]%)		152(6.6%)	338(100.0%)	N.A.	161(7.7%)	154(8.8%)	43(4.7%)
1965-66	198(10.[illegible]%)		158(7.4%)	309(100.0%)	N.A.	N.A.	141(8.5%)	69(5.4%)
1966-67	213(11.4%)		153(7.5%)	306(100.0%)	N.A.	N.A.	158(9.4%)	112(8.2%)
1967-68	229(11.4%)	89(8.3%)	170(7.4%)	358(100.0%)	N.A.	176(------)	167(9.5%)	80(7.4%)
1968-69	262(11.1%)	174([illegible]%)	203(7.3%)	350(100.0%)	N.A.	N.A.(------)	168(8.4%)	99(7.9%)
1969-70	287(10.7%)	213(9.[illegible]%)	21[illegible](7.1%)	379(100.0%)	N.A.	187(7.5%)	221(9.6%)	113(7.2%)
1970-71	321(11.3%)	282(11.5%)	272(8.1%)	727(100.0%)	N.A.	219(8.5%)	273(10.2%)	147(7.7%)
1971-72	294(11.4%)	341(14.6%)	395(12.4%)	669(53.7%)	N.A.	392(11.3%)	333(13.0%)	306(11.3%)
Average Per Cent Growth	7.8	70.8	103.9*	23.9	N.A.	15.2	23.5	52.7

*Average of school years 1961-62 to 1971-72 since the growth from 1960-61 is incalculable but dramatic.

Medical School--Male Applicants

School Year	Hahnemann	Hershey	Jefferson	Med. College Pennsylvania	Philadelphia Osteopathic	Temple	Univ. Penna.	Univ. Pittsburgh
1960-61			1,334(100.0%)	N.A.	N.A.	N.A.	1,537(94.3%)	N.A.
1961-62			1,214(97.0%)	N.A.	N.A.	N.A.	1,199(93.7%)	585(92.9%)
1962-63	682(79.8%)[b]		1,342(97.5%)	N.A.	N.A.	N.A.	1,298(93.8%)	675(94.1%)
1963-64	1,316(89.3%)		1,668(95.9%)	0(0.0%)	N.A.	1,613(90.1%)	1,353(91.7%)	757(94.6%)
1964-65	1,692(89.9%)		2,170(93.4%)	0(0.0%)	N.A.	1,918(92.3%)	1,603(91.2%)	879(95.3%)
1965-66	1,623(89.1%)		1,986(92.6%)	0(0.0%)	N.A.	N.A.	1,515(91.5%)	1,210(94.6%)
1966-67	1,658(88.6%)		1,884(92.5%)	0(0.0%)	N.A.	N.A.	1,524(90.6%)	1,252(91.8%)
1967-68	1,786(88.6%)	988(91.7%)	2,138(92.6%)	0(0.0%)	N.A.	N.A.	1,583(90.5%)	1,002(92.6%)
1968-69	2,108(88.9%)	1,732(90.9%)	2,574(92.7%)	0(0.0%)	N.A.	N.A.	1,830(91 6%)	1,151(92.1%)
1969-70	2,405(89.3%)	1,950(90.1%)	2,772(92.9%)	0(0.0%)	N.A.	2,301(92.5%)	2,083(90.4%)	1,463(92.8%)
1970-71	2,513(88.7%)	2,179(88.5%)	3,067(91.9%)	0(0.0%)	N.A.	2,353(91.5%)	2,417(89.8%)	1,771(92.3%)
1971-72	2,294(88.6%)	1,998(85.4%)	2,799(87.6%)	578(53.7%)	N.A.	3,079(88.7%)	2,232(87.0%)	2,399(88.7%)
Average Per Cent Growth	26.3	25.6	10.0	*	N.A.	11.4	4.1	31.0

*Growth incalculable, but dramatic, over last year of this series.

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[a] Data from survey of the medical schools conducted by the author.

[b] Percentage of total applicants.

The estimates of annual percentage growth at the bottom of each set of figures are based upon the years for which data were available. In some instances, the medical schools were unable to provide data for more than two years back. These annual percentage increase estimates are therefore not strictly comparable under the same time period involved, but they do indicate that applicant activity has increased for all of the institutions regardless of the origin or sex of the applicant with some institutions reflecting quite dramatic increases particularly in recent years, e.g., Hershey, the Medical College of Pennsylvania, the University of Pittsburgh and Philadelphia Osteopathic. In general, the larger medical schools had more moderate growth patterns, with Hahnemann a notable exception.

Historical First Year Class Trends

Table 27 is similar to Table 26 but traces the patterns for first year entrants to the medical schools of Pennsylvania. Here we see more moderate growth estimates ranging from 0.4 per cent per annum for the Medical College of Pennsylvania to 18.8 per cent per annum for the newly created Hershey Medical School. The median value for the seven established institutions is 1.9 per cent per annum, a far cry from the figure of 22.52 per cent applicant growth for these institutions.

So far as Pennsylvania resident enrollment is concerned, the proportion of Pennsylvania residents in the first year class has increased dramatically in one instance, e.g., the Medical College of Pennsylvania with 33.3 per cent in 1960-61 to 60.6 per cent in 1971-72. Unfortunately, the proportion of Pennsylvania residents has also decreased in the case of the University of Pennsylvania Medical School (56 per cent to 47.5 per cent), the University of Pittsburgh (81 per cent to 72 per cent), and the Philadelphia College of Osteopathic Medicine (77.5 per cent to 64 per cent) despite a general increase in the number of Pennsylvania residents in the first year of medical school.

The proportion of females in the first year class has increased markedly in the case of Jefferson Medical School (0.0 per cent to 13.2 per cent), Temple (4 per cent to 15 per cent) and the University of Pennsylvania (5 per cent to 11 per cent), while decreasing from 100 per cent to 91 per cent in the previously all female Medical College of Pennsylvania.

All told, the medical schools of Pennsylvania in 1970-71 had a median percentage of Pennsylvania residents of 67.9 per cent with a low of 30.7 per cent (University of Pennsylvania) since raised to 47.5 per cent in 1971-72 and a high of 78.1 per cent (Temple), since increased to 78.8 per cent in 1971-72. With the exception of the Medical College of Pennsylvania, they had an institutional median proportion of females in the first year class of 11.9 per cent, with a high of 23.8 per cent for the University of Pittsburgh and a low of 3.8 per cent for the Philadelphia School of Osteopathic Medicine.

The Pennsylvania resident historical trends are even more clearly discernable in Table 28 with regard to both applicant activity and the first year classes of 1961-62 to 1971-72.

Legal Residence of Medical Students

Table 29 summarizes findings concerning a comparison between the fall 1971 legal residence of the full-time student body of the medical schools of Pennsylvania and the legal residence of the 1970-71 school-year graduates.

As may be seen, residents of foreign countries comprise a very small part (0.7 per cent) of our medical students. The proportion of Pennsylvania residents varies markedly between state-related (77.2 per cent) and private state-aided medical schools (58.7 per cent), with the figures for the graduates very similar in pattern.

The differences between the legal residence of the graduates and the student body as a whole suggests that the private medical schools may be taking more foreign medical students and fewer out-of-state students than in the past along with a substantial increase in the proportion of Pennsylvania residents.

In contrast, the data of Table 29 suggest that the state-related medical schools are taking somewhat fewer Pennsylvania residents, somewhat more out-of-state residents and slightly fewer foreign residents.

The data of Table 29 were taken from the reports sent to the Division of Educational Statistics of the Commonwealth rather than the survey forms, with the exception of the Philadelphia College of Osteopathic Medicine. Additional data from Hershey were available (note b of Table 29), indicating the proportion of Pennsylvania residents in the graduating class of 1972 to be 87.8 per cent in contrast to the 84.8 per cent figure of 1971. All of these data are, however, somewhat suspect. It is possible for a medical student from another state to establish legal residence in

Table 27

Historical Trends for Pennsylvania Medical School Entrants to the First Year[a]

Medical School--First Year Class Size

School Year	Hahnemann	Hershey	Jefferson	Med.College Pennsylvania	Philadelphia Osteopathic	Temple	Univ. Penna.	University Pittsburgh
1960-61	110		176	63	91	137	125	101
1961-62	110		176	62	88	136	125	101
1962-63	110		175	64	93	138	129	102
1963-64	110		178	64	89	137	126	102
1964-65	110		176	60	100	137	127	102
1965-66	110		176	64	93	137	125	101
1966-67	110		176	64	95	139	125	106
1967-68	115	40	186	66	113	137	133	108
1968-69	115	48	192	66	123	146	132	107
1969-70	115	64	192	66	145	146	151	109
1970-71	118	69	212	66	152	160	150	128
1971-72	130[b]	70	212	66	160	160	160	130
Average Per Cent Growth	1.7	18.8	1.9	0.4	6.9	1.5	2.5	2.6

Medical School--Pennsylvania Entrants

School Year	Hahnemann	Hershey	Jefferson	Med.College Pennsylvania	Philadelphia Osteopathic	Temple	Univ. Penna.	University Pittsburgh
1960-61	N.A.		118(67.0%)	21(33.3%)	N.A.	N.A.	70(56.0%)	82(81.2%)
1961-62	N.A.		115(65.3%)	11(17.7%)	N.A.	N.A.	67(53.6%)	82(81.2%)
1962-63	69(62.7%)[c]		126(72.0%)	16(25.0%)	N.A.	N.A.	74(57.4%)	70(68.6%)
1963-64	78(70.9%)		138(77.5%)	19(29.7%)	69(77.5%)	105(76.6%)	73(57.9%)	60(58.8%)
1964-65	74(67.3%)		117(66.5%)	16(26.7%)	76(76.0%)	104(75.9%)	66(52.0%)	72(70.6%)
1965-66	79(71.8%)		106(60.2%)	14(21.9%)	61(65.6%)	N.A.	56(44.8%)	64(63.4%)
1966-67	77(70.0%)		105(59.7%)	18(28.1%)	62(65.3%)	102(73.4%)	53(42.4%)	60(56.6%)
1967-68	85(73.9%)	31(77.5%)	119(64.0%)	18(27.3%)	80(70.8%)	105(76.6%)	48(36.1%)	77(71.3%)
1968-69	85(73.9%)	38(79.2%)	138(71.9%)	22(33.3%)	82(66.7%)	115(78.8%)	48(36.4%)	82(76.6%)
1969-70	80(69.6%)	44(68.8%)	134(69.8%)	34(51.5%)	103(71.0%)	110(75.3%)	46(30.5%)	81(74.3%)
1970-71	82(69.5%)	38(55.1%)	158(74.5%)	26(39.4%)	101(66.4%)	125(78.1%)	46(30.7%)	91(71.1%)
1971-72	-[b]	55(78.6%)	156(73.6%)	40(60.6%)	102(63.8%)	126(78.8%)	76(47.5%)	94(72.3%)
Average Per Cent Growth	2.4	19.4	2.9	8.2	6.0	2.5	0.8	1.3

Medical School--Out-of-State Entrants

School Year	Hahnemann	Hershey	Jefferson	Med.College Pennsylvania	Philadelphia Osteopathic	Temple	Univ. Penna.	University Pittsburgh
1960-61	N.A.		58(33.0%)	42(66.7%)	N.A.	N.A.	55(44.0%)	19(18.8%)
1961-62	N.A.		61(34.7%)	51(82.3%)	N.A.	N.A.	58(46.4%)	19(18.8%)
1962-63	41(37.3%)[c]		49(28.0%)	48(75.0%)	N.A.	N.A.	55(42.6%)	32(31.4%)
1963-64	32(29.1%)		40(22.5%)	45(70.3%)	20(22.5%)	32(23.4%)	53(42.1%)	42(41.2%)
1964-65	36(32.7%)		59(33.5%)	44(73.3%)	24(24.0%)	33(24.1%)	61(48.0%)	30(29.4%)
1965-66	31(28.2%)		70(39.8%)	50(78.1%)	32(34.4%)	N.A.	69(55.2%)	37(36.6%)
1966-67	33(30.0%)		71(40.3%)	46(71.9%)	33(34.7%)	37(26.6%)	72(57.6%)	46(43.4%)
1967-68	30(26.1%)	8(22.5%)	67(36.0%)	48(72.7%)	33(29.2%)	32(23.4%)	85(63.9%)	31(28.7%)
1968-69	30(26.1%)	10(20.8%)	54(28.1%)	44(66.7%)	41(33.3%)	31(21.2%)	84(63.6%)	25(23.4%)
1969-70	35(30.4%)	20(31.2%)	58(30.2%)	32(48.5%)	42(29.0%)	36(24.7%)	105(69.5%)	28(25.7%)
1970-71	36(30.5%)	31(44.9%)	54(25.5%)	40(60.6%)	51(33.6%)	35(21.9%)	104(69.3%)	37(28.9%)
1971-72	-[b]	15(21.4%)	56(26.4%)	26(39.4%)	58(36.2%)	34(21.2%)	84(52.5%)	36(27.7%)
Average Per Cent Growth	-1.5	21.9	-0.3	-3.5	23.8	0.8	4.8	8.1

Medical School--Female Entrants

School Year	Hahnemann	Hershey	Jefferson	Med.College Pennsylvania	Philadelphia Osteopathic	Temple	Univ. Penna.	University Pittsburgh
1960-61	7(6.4%)[c]		0(0.0%)	63(100.0%)	2(2.2%)	5(3.6%)	6(4.8%)	7(6.9%)
1961-62	4(3.6%)		9(5.1%)	62(100.0%)	3(3.4%)	12(8.8%)	4(3.2%)	6(5.9%)
1962-63	3(2.7%)		10(5.7%)	64(100.0%)	1(1.1%)	9(6.5%)	6(4.7%)	5(4.9%)
1963-64	5(4.6%)		12(6.7%)	62(96.9%)	2(2.2%)	15(10.9%)	5(4.0%)	8(7.8%)
1964-65	11(10.0%)		11(6.3%)	60(100.0%)	6(6.0%)	14(10.2%)	8(6.3%)	6(5.9%)
1965-66	6(5.5%)		13(7.4%)	64(100.0%)	2(2.2%)	15(10.9%)	6(4.8%)	11(10.9%)
1966-67	9(8.2%)		13(7.4%)	64(100.0%)	3(3.2%)	10(7.2%)	5(4.0%)	7(6.6%)
1967-68	8(7.0%)	3(7.5%)	16(8.6%)	66(100.0%)	3(2.7%)	11(8.0%)	10(7.5%)	13(12.0%)
1968-69	12(10.4%)	4(8.3%)	22(11.5%)	66(100.0%)	6(4.9%)	14(9.6%)	11(8.3%)	10(9.3%)
1969-70	19(16.5%)	6(9.4%)	19(9.9%)	66(100.0%)	3(2.1%)	13(8.9%)	17(11.3%)	4(3.7%)
1970-71	14(11.9%)	7(10.1%)	26(12.3%)	60(90.0%)	3(2.0%)	13(8.1%)	18(12.0%)	9(7.0%)
1971-72	10(7.7%)	7(10.0%)	28(13.2%)	60(90.9%)	6(3.8%)	24(15.0%)	17(10.6%)	31(23.8%)
Average Per Cent Growth	3.9	33.3	21.1	-0.4	10.2	34.5	16.7	31.2

Medical School--Male Entrants

School Year	Hahnemann	Hershey	Jefferson	Med.College Pennsylvania	Philadelphia Osteopathic	Temple	Univ. Penna.	University Pittsburgh
1960-61	103(93.6%)[c]		176(100.0%)	0(0.0%)	89(97.8%)	132(96.4%)	119(95.2%)	94(93.1%)
1961-62	106(96.4%)		167(94.9%)	0(0.0%)	85(96.6%)	124(91.2%)	121(96.8%)	95(94.1%)
1962-63	107(97.3%)		165(94.3%)	0(0.0%)	92(98.9%)	129(93.5%)	123(95.3%)	97(95.1%)
1963-64	105(95.4%)		166(93.3%)	2(3.1%)	87(97.8%)	122(89.1%)	121(96.0%)	94(92.2%)
1964-65	99(90.0%)		165(93.7%)	0(0.0%)	94(94.0%)	123(89.8%)	119(93.7%)	96(94.1%)
1965-66	104(94.5%)		163(92.6%)	0(0.0%)	91(97.8%)	122(89.1%)	119(95.2%)	90(89.1%)
1966-67	101(91.8%)		163(92.6%)	0(0.0%)	92(96.8%)	129(92.8%)	120(96.0%)	99(93.4%)
1967-68	107(93.0%)	37(92.5%)	170(91.4%)	0(0.0%)	110(97.3%)	126(92.0%)	123(92.5%)	95(88.0%)
1968-69	103(89.6%)	44(91.7%)	170(88.5%)	0(0.0%)	117(95.1%)	132(90.4%)	121(91.7%)	97(90.7%)
1969-70	96(83.5%)	58(90.6%)	173(90.1%)	0(0.0%)	142(97.9%)	133(91.1%)	134(88.7%)	105(96.3%)
1970-71	104(88.1%)	62(89.9%)	186(87.7%)	6(9.1%)	149(98.0%)	147(91.9%)	132(88.0%)	119(93.0%)
1971-72	120(92.3%)	63(90.0%)	184(86.8%)	6(9.1%)	154(96.2%)	136(85.0%)	143(89.4%)	99(76.2%)
Average Per Cent Growth	1.5	17.6	0.4	25.0	6.6	0.3	1.8	0.5

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[a] Data derived from Survey of Medical Schools conducted for this study.

[b] First year figure modified from 118 to 130 and female entrant figure from 10 to 11 on basis of November 30, 1971 report to Division of Educational Statistics, Bureau of Information Systems, Commonwealth of Pennsylvania. Data breakdown as to Pennsylvania entrants is therefore considered as questionable and is not given.

[c] Percentage of first year entrants.

Table 28

Historical Pattern of the Pennsylvania Resident Proportion of First Year Entrants and Applicants to Pennsylvania's Medical Schools[a]

Applicants

School	1961-1962	1962-1963	1963-1964	1964-1965	1965-1966	1966-1967	1967-1968	1968-1969	1969-1970	1970-1971	1971-1972
	%	%	%	%	%	%	%	%	%	%	%
Hahnemann	N.A.	48.2	46.8	43.3	43.3	38.7	41.3	38.9	38.9	38.8	37.9
Hershey[b]							52.0	47.5	33.8	41.4	44.3
Jefferson	48.1	48.1	46.3	38.3	45.8	36.2	38.9	29.9	30.7	29.4	35.2
Medical College of Pa.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	23.7	33.7
Philadelphia Osteopathic	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Temple	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	41.3	40.9	41.4	35.3
U. Pennsylvania	28.1	32.9	32.1	31.8	29.6	27.7	25.0	25.2	21.7	18.3	22.8
U. Pittsburgh	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	36.6	39.3	38.5	34.2

First-Year Entrants

School	1961-1962	1962-1963	1963-1964	1964-1965	1965-1966	1966-1967	1967-1968	1968-1969	1969-1970	1970-1971	1971-1972
Hahnemann	N.A.	62.7	70.9	67.3	71.8	70.07	73.9	73.9	69.6	69.5	69.5
Hershey							77.5	79.2	68.8	55.1	78.6
Jefferson	65.3	72.0	77.5	66.5	60.2	59.7	64.0	71.9	69.8	74.5	73.6
Medical College of Pa.	17.7	25.0	29.7	26.7	21.9	28.1	27.3	33.3	51.5	39.4	60.6
Philadelphia Osteopathic	N.A.	N.A.	77.5	76.0	65.6	65.3	70.8	66.7	71.0	66.4	63.8
Temple	N.A.	N.A.	76.6	75.9	N.A.	73.4	76.6	78.8	75.3	78.1	78.8
U. Pennsylvania	53.6	57.4	57.9	52.0	44.8	42.4	36.1	36.4	30.5	30.7	47.5
U. Pittsburgh	81.2	68.6	58.8	70.6	63.4	56.6	71.3	76.6	74.3	71.1	72.3

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[a] Data derived from survey responses found in Appendix.

[b] Hershey is a new medical school that began accepting applicants and students in 1968/69.

Table 29

Legal Residence of Full-Time Medical Students and Graduates[a]

A. Legal Residence of Full-Time Students, Fall 1971

School	Total	Residents of Pennsylvania	Residents of Other States	Residents of Foreign Countries
State Related	1,319	1,019(77.2%)	291(22.1%)	9(0.7%)
Hershey	237	169(71.3%)	67(28.3%)	1(0.4%)
Temple	617	508(82.3%)	104(16.9%)	5(0.8%)
Pittsburgh	465	342(73.6%)	120(25.8%)	3(0.6%)
Private State-Aided	2,154	1,264(58.7%)	874(40.6%)	16(0.7%)
Hahnemann	475	328(69.1%)	146(30.7%)	1(0.2%)
Medical College of Pa.	269	135(50.2%)	131(48.7%)	3(1.1%)
Jefferson	810	597(73.7%)	210(25.9%)	3(0.4%)
Pennsylvania	600	204(34.0%)	387(64.5%)	9(1.5%)
Phila. Osteopathic	575	404(70.3%)	169(29.4%)	2(0.3%)
Grand Total	4,048	2,687(66.4%)	1,334(32.9%)	27(0.7%)

B. Legal Residence of Graduates 1970-71

School	Total	Residents of Pennsylvania	Residents of Other States	Residents of Foreign Countries
State Related	263	209(79.4%)	52(19.8%)	2(0.8%)
Hershey	33	28(84.8%)[b]	5(15.2%)	- -
Temple	134	110(82.1%)	22(16.4%)	2(1.5%)
Pittsburgh	96	71(74.0%)	25(26.0%)	- -
Private State-Aided	474	253(53.4%)	219(46.2%)	2(0.4%)
Hahnemann	107	72(67.3%)	35(32.7%)	- -
Medical College of Pa.	52	15(28.8%)	36(69.2%)	1(1.9%)
Jefferson	184	117(63.6%)	67(36.4%)	- -
Pennsylvania	131	49(37.4%)	81(61.8%)	1(0.8%)
Phila. Osteopathic	106	70(66.0%)	36(34.0%)	- -
Grand Total	843	532(63.1%)	307(36.4%)	4(0.5%)

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[a] Data provided by Division of Educational Statistics, Bureau of Information Systems, Department of Education, Commonwealth of Pennsylvania, with the exception of the data for the Philadelphia College of Osteopathic Medicine which was obtained from their survey return.

[b] Of Hershey's June 1972 graduating class of 41 students, 36 were originally admitted as Pennsylvania residents, i.e., 87.8 per cent were residents of Pennsylvania.

Pennsylvania for the express purpose of avoiding the higher rate of tuition charged to out-of-state students. The report of the medical schools may be based, in some instances at least, upon the current legal residence of their students at the time of graduation.

Applicant Residence

In Table 30, for each state, the number of male and female applicants as a whole or with one or more acceptances by a medical school is given. The percentage with one or more acceptances, the total number of applications and the average number of applications is also given. At the bottom of the table the rank of Pennsylvania in comparison to the 50 states is indicated.

Pennsylvania apparently does very well in terms of the number of applicants and acceptances since it ranks second or third on these items. **Only New York (1,439) and California (730) have more accepted applicants than Pennsylvania (702), and a similar pattern is found for the number of applicants as a whole.**

The picture is not so bright, however, when one examines the figures for percentage of applicants with one or more acceptances. Despite the fact that the Pennsylvania applicants submit 5.8 applications per applicant (ranking 10th among the states), **Pennsylvania ranks 40th with regard to the percentage of its applicants accepted by a U.S. medical school** (39.5 per cent of all Pennsylvania applicants receive at least one acceptance). The situation for female applicants is somewhat better, with Pennsylvania ranking 30th out of the 50 states (43.6 per cent with an acceptance). It should be noted, however, that the generally superior California does less well than Pennsylvania in this regard with only 35.2 per cent of her resident applicants receiving acceptances. New York State, in contrast, does better than either California or Pennsylvania with its acceptance rate of 43 per cent.

These findings may be due to the fact that we have so large a number of applicants relative to our training capacity. This possibility seems unlikely since New York has an even larger number of applicants but a better acceptance rate. It seems far more likely that the acceptance rate is a reflection of (1) the excellence of the premedical and public school training received by its residents, (2) the degree to which the medical schools in the home state give preference to residents due to geographic isolation, etc. (Alaska, Hawaii) and (3) willingness and ability to train state residents even though not as qualified by their education as residents from other states, e.g., Mississippi.

Pennsylvania may actually be doing quite well despite the situation depicted in Table 29, but definitive data pinpointing the issue are lacking.

The Quality of Pennsylvania's Medical Students

An examination of Tables 31 and 32 suggests that Pennsylvania's position with regard to the quality of its medical students has not only been increasing with the years but also exceeds that characterizing the nation's medical students as a whole. Unfortunately, not all of the medical schools were able to provide mean Medical College Aptitude Test scores for the years tabled. The tabled data (Table 32), therefore, are a mean of the mean values for Temple and the University of Pittsburgh only. If we assume, however, that the national accepted applicant figures in Table 31 are roughly equivalent to the first year students in Table 32, we find that the national mean scores on the Medical College Aptitude Test for the year 1969-70 accepted applicant groups are consistently higher than those for the two Pennsylvania medical schools in Table 32. The reverse was the case earlier in the decade. For 1969-70 the MCAT verbal mean score nationally was 562 while the Pennsylvania mean score (Temple and Pittsburgh combined) was 612.5. In 1961-62 the national score was 533 and for these two Pennsylvania institutions it was 512.5.

As may be seen in Table 31, the national proportion of applicants accepted by the medical schools has declined over the decade from approximately 60 per cent to 43 per cent while the number of accepted and nonaccepted applicants combined has risen from 14,397 to 24,465 in 1969-70 and, as indicated earlier, in this report, to approximately 35,000 in 1971.[8]

In Table 32, we find that the MCAT mean score differences between applicants in general and successful admitted applicants (first year class enrollees) has steadily increased over time. In 1961, for example, the applicants in general and those applicants in the first year of medical school differed by 3.5 points in verbal aptitude, and 12 points in quantitative aptitude, 7.5 points in general information and 19 points in science. Apparently selection was primarily based on quantitative and scientific aptitude.

In 1969 on the other hand, we now find much larger differences in all of the scales, i.e., verbal, 66 points, quantitative, 34 points, general information, 22 points and science, 46.5 points. The greatest growth occurred in the first year class verbal and quantitative aptitude scores, i.e., 19.51 per cent and a 18.82 per

Table 30

A Comparison Between Areas of Residence for Applicants who have been Accepted and Applicants Generally with Regard to Rate of Acceptance and Average Number of Applications Submitted to the Medical Schools of the United States[a]

State or Region	Applicants with One or More Acceptance			Percentage with One or More Acceptance			Total Number of Applicants	Total Applications	Average Number of Applications
	Male	Female	Total	Male	Female	Total			
Alabama	122	7	129	47.3	35.0	46.4	278	931	3.3
Alaska	8	0	8	57.1	----	57.1	14	75	5.4
Arizona	76	8	84	45.7	38.1	41.0	205	1,040	5.1
Arkansas	90	3	93	46.4	33.3	45.8	203	403	2.0
California	665	65	730	35.6	31.1	35.2	2,076	13,581	6.5
Colorado	82	7	89	46.3	41.2	45.9	194	737	3.8
Connecticut	143	25	168	41.7	48.1	42.5	395	3,140	8.0
Delaware	19	2	21	35.2	100.0	37.5	56	310	5.5
District of Columbia	67	10	77	46.5	34.5	44.5	173	723	4.2
Florida	225	21	246	37.4	48.8	38.1	645	3,087	4.8
Georgia	184	16	200	40.5	45.7	40.9	489	1,563	3.2
Hawaii	49	3	52	59.0	50.0	58.4	89	469	5.3
Idaho	25	0	25	36.8	0.0(3)[b]	35.2	71	331	4.7
Illinois	536	55	591	45.1	50.0	45.5	1,299	7,160	5.5
Indiana	253	23	276	45.3	45.1	45.3	609	1,936	3.2
Iowa	132	15	147	49.1	51.7	49.3	298	1,015	3.4
Kansas	127	16	143	46.9	61.5	48.2	297	964	3.3
Kentucky	178	19	197	51.6	59.4	52.3	377	1,182	3.1
Louisiana	198	13	211	52.4	50.0	52.2	404	1,048	2.6
Maine	29	0	29	50.9	0.0(4)	47.5	61	371	6.1
Maryland	216	32	248	49.2	54.2	49.8	498	2,611	5.2
Massachusetts	259	34	293	40.9	36.6	40.3	727	6,223	8.6
Michigan	351	36	387	46.3	44.4	41.2	939	3,909	4.2
Minnesota	188	25	213	47.2	49.0	47.4	449	1,691	3.8
Mississippi	110	12	122	49.3	63.2	50.4	242	565	2.3
Missouri	166	10	176	45.7	40.0	45.4	388	1,738	4.5
Montana	25	2	27	31.6	33.3	31.8	85	452	5.3
Nebraska	130	9	139	53.5	60.0	33.9	258	670	2.6
Nevada	9	0	9	25.7	0.0(1)	25.0	36	215	6.0
New Hampshire	16	0	16	34.8	0.0(2)	33.3	48	281	5.9
New Jersey	430	45	475	40.8	38.1	40.6	1,171	9,035	7.7
New Mexico	43	7	50	46.7	87.5	50.0	100	356	3.6
New York	1,275	164	1,439	42.5	46.9	43.0	3,350	30,649	9.2
North Carolina	157	18	175	45.9	58.1	46.9	373	1,460	3.9
North Dakota	39	4	43	61.9	66.7	62.3	69	154	2.2
Ohio	436	37	473	42.2	52.1	42.8	1,104	5,758	5.2
Oklahoma	137	9	146	43.6	45.0	43.7	334	1,142	3.4
Oregon	95	9	104	52.8	50.0	52.5	198	871	4.4
Pennsylvania	620	82	702	39.0	43.6	39.5	1,776	10,232	5.8
Rhode Island	27	6	33	36.5	50.0	38.4	86	661	7.7
South Carolina	139	10	149	58.2	58.8	58.2	256	666	2.6
South Dakota	36	1	37	52.9	16.7	50.0	74	210	2.8
Tennessee	210	18	228	54.4	56.3	54.5	418	1,131	2.7
Texas	435	51	486	46.1	54.3	46.8	1,038	4,264	4.1
Utah	60	2	62	28.0	40.0	28.3	219	1,168	5.3
Vermont	30	2	32	69.8	28.6	64.0	50	142	2.8
Virginia	185	17	202	46.7	51.5	47.1	429	1,804	4.2
Washington	112	7	119	41.0	38.9	40.9	291	1,317	4.5
West Virginia	78	12	90	50.3	42.9	49.2	183	578	3.2
Wisconsin	186	15	201	46.9	39.5	46.2	435	2,073	4.8
Wyoming	10	2	12	32.3	50.0	34.3	35	201	5.7
Puerto Rico	73	18	91	41.7	25.4	37.0	246	408	1.7
U. S. Possessions	4	0	4	66.7	0.0(1)	57.1	7	23	3.3
Canada	7	2	9	6.2	13.3	6.9	130	367	2.8
Foreign	32	6	38	19.2	26.1	20.0	190	731	3.9
United States	9,418	986	10,404	43.4	45.2	43.6	23,892	132,293	5.5
Total	9,534	1,012	10,546	43.0	44.2	43.1	24,465	133,822	5.5
Pa. Ranking[c] (50 States)	3	2	3	40	30	40	3	3	10

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[a] Data abstracted and derived from Table 10 in "A Study of U.S. Medical School Applicants, 1969-70" by Stritter, F. T., Hutton, J. G., Jr., and Duke, W. F., Journal of Medical Education, Vol. 46, January 1971.

[b] Number in parentheses indicates number of female applicants who were not accepted.

[c] Ranked from largest figure to lowest, i.e., 1 to 50.

Table 31

National Mean MCAT Score Patterns of Accepted and Nonaccepted Medical School Applicants 1960-61 Through 1969-70[a]

First Year Class	Verbal Ability	Quantitative Ability	General Information	Science	Total Applicants	Per Cent Accepted of Total Applicants
			Accepted Applicants			
1960-61	527	533	527	533	8,560	59.5
1961-62	533	538	522	537	8,682	60.4
1962-63	544	537	541	545	8,959	56.5
1963-64	537	552	549	545	9,063	51.2
1964-65	540	567	561	556	9,043	47.2
1965-66	541	583	565	549	9,012	48.2
1966-67	549	584	566	550	9,123	50.0
1967-68	554	596	566	565	9,702	51.8
1968-69	556	600	570	577	10,092	47.8
1969-70	562	603	569	577	10,547	43.1
			Nonaccepted Applicants			
1960-61	464	453	473	449	5,837	
1961-62	469	465	469	458	5,699	
1962-63	475	464	485	460	6,888	
1963-64	484	476	501	467	8,605	
1964-65	481	492	509	473	10,125	
1965-66	473	502	511	466	9,691	
1966-67	488	510	516	478	9,127	
1967-68	496	514	514	485	9,022	
1968-69	497	526	519	495	11,026	
1969-70	506	536	524	507	13,918	

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[a] Data abstracted from a reprint of the article, "Study of U.S. Medical School Applicants, 1969-70," that appeared in the January 1971 issue of the Journal of Medical Education published by the Association of American Medical Colleges. (See Stritter, F. T.,Hutton, Jr., J. G. and Duke, W. F. reference in the Bibliography.)

Table 32

MCAT Mean Scores and Mean Score Differences Over Time for Applicants and First Year Students from Two Medical Schools Providing Complete Data (Temple and Pittsburgh)[a]

Year	Verbal			Quantitative			General Information			Science		
	Appli- cant	1st Year	Diff.	Appli- cant	1st Year	Diff.	Appli- cant	1st Year	Diff.	Appli- cant	1st Year	Diff.
1961	509.0	512.5	3.5	503.5	515.5	12.0	504.0	511.5	7.5	502.5	521.5	19.0
1962	516.5	539.5	23.0	504.0	531.0	27.0	513.0	530.0	17.0	507.0	547.0	40.0
1963	523.5	541.0	17.5	516.0	545.0	29.0	530.5	549.5	19.0	512.5	555.0	42.5
1964	521.5	559.0	37.5	517.0	550.5	33.5	539.0	575.0	36.0	517.0	562.0	45.0
1965	525.5	569.0	43.5	540.5	594.5	54.0	550.5	579.5	29.0	521.0	575.0	54.0
1966	532.5	598.0	65.5	557.5	598.5	40.5	555.5	584.5	29.0	524.0	576.0	52.0
1967	542.5	603.0	60.5	566.0	603.0	37.0	557.5	569.5	12.0	533.5	572.5	39.0
1968	545.5	610.5	65.5	576.5	610.5	34.0	560.5	584.5	24.0	551.5	597.0	45.5
1969	546.5	612.5	66.0	578.5	612.5	34.0	559.0	581.0	22.0	555.0	601.5	46.5
% Change	7.37%	19.51%		14.90%	18.82%		10.91%	13.59%		10.45%	15.34%	

[a] Mean values shown in this table represent an arithmetic average of the applicant or class mean values cited by the two schools in question. MCAT is an acronym for the Medical College Aptitude Test required of applicants for admission.

cent increase, respectively. The increase in the general run of applicant verbal scores did not match those of the accepted (first year class) applicants, e.g., 7.37 per cent verbal (applicant) compared with 19.51 per cent increase for the first year class. The findings of Table 31 and 32, taken as a whole, suggest that we have been, nationally, and in Pennsylvania, selecting medical students on an increasingly stringent basis and, furthermore, that we have been selecting them based on their high quantitative and intellectual (verbal aptitude) skills.

Several implications may well follow from this. First, we could easily increase the number selected (enlarged medical school classes) without seriously impairing the quality of the physicians produced, since it can hardly be argued that the acceptable candidate in 1960 or 1961 would not still be acceptable in 1972 if a place were available.

Since the number of applicants has increasingly exceeded the number of student seats available, the medical schools have been able to, in effect, select from what was, in 1960-61, an already highly select and able group. It would, therefore, seem likely that more student places would only make the selection process less rigorous rather than produce a severe reduction in the quality of our medical students. In light of this, expansion of the nation's medical schools certainly seems feasible although the question still remains as to whether such expansion is now necessary or desirable.

It could be argued that rigorous selection on the basis of quantitative and scientific aptitude, while not undesirable per se, is certainly likely to produce more physicians who are likely to specialize or to seek to engage in research and other challenging activities outside of patient care. Perhaps our medical schools should admit more of the less intellectually able applicants. Such students might attrite more frequently but they might also be more amenable to the possibility of becoming family physicians.

The existing selection process may very well be systematically screening out the would be physician coming from a rural area. Such students might well be more willing to practice in a rural area, but they do not get the quality of basic science and mathematics education that the suburban student takes for granted. They, therefore, do less well in their premedical courses and are thus, weaker applicants for entry into medical school.

Summary

The supply of physicians should increase markedly during the 1971-80 period if the medical schools of Pennsylvania increase their enrollments as they now project.

Such increases in supply will vary in amount with the area of specialization involved, with basic care specialities such as internal medicine, pediatrics and family practice growing less than the more specialized areas, unless the values of the physician become less oriented toward the good life, monetary return and intellectually challenging specialism.

Enrollment in medical school is not keeping pace with student demand for medical education and the result is an increasing selectivity which encourages specialism.

Foreign - trained physicians are meeting an enormous part of our demand for physicians, with approximately one-half of all new physicians in a given year in the United States being foreign-trained. These foreign-trained physicians come, in large part, from countries that can ill afford to lose them (Asia, Africa, South America, Philippines).

There is sound reason on this basis to believe that our medical system is not producing enough physicians to meet the demand, and it is ethically questionable whether either Pennsylvania or the nation should continue to depend upon foreign-trained physicians as a primary source of physicians. For that matter, will these nations, from whom we draw their sorely needed physicians, continue to permit us to drain their medical resources by importing the physicians they train at such cost to themselves?

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CHAPTER VIII

PHYSICIAN GROWTH

In any attempt to project growth it must be remembered that factors are playing a role, or may well play a role, that historically have had relatively little or no impact. We cannot, for example, anticipate the impact of a change in the delivery system on the basis of past trends since changes caused by a shift to national health plans, etc., have no historical precedent in this country.

The future growth of the medical profession is likely to be influenced by some or all of the following:

1. Increases in population, especially in the young and older groups.
2. Rising health consciousness of the public with a consequent increase in demand for services.
3. Higher standards of health care than are now current.
4. A probable expansion of prepaid medical care.
5. Continued or increased care for members of the armed forces, their families, and for veterans.
6. A continued growth in public health, rehabilitation, industrial medicine and mental health programs and facilities.
7. An increased need for research personnel and medical school faculty as we seek to develop biomedical medicine and find the basic causes of such diseases as cancer, arteriosclerosis, hypertension and osteoarthritis.

The Bureau of Labor Statistics of the U.S. Department of Labor in its bulletin, **College Educated Workers 1968-1980** projects an increase in the total number of U.S. physicians (D.O.'s excluded) from 295,000 in 1968 to 450,000 in 1980.[1] The publication, **Occupational and Manpower Training Needs,** published in 1971[2] cites the same figures for physicians and also a growth from 1,200 in 1968 to 18,500 in 1980 for osteopaths (increase of 54.2 per cent).

For all physicians combined (M.D. and D.O.) the growth anticipated is a 52.6 per cent increase from 1968-1980 or some 161,500 physicians and osteopaths during this period. This would average about 13,458 per year, a figure which is somewhat smaller than their published figure adding up to 13,800[2]. In addition to growth demand, physicians will be needed to replace those who die or retire. The Bureau of Labor Statistics has estimated a figure of 7,300 annually to meet this need. This represents an estimated combined death and retirement rate of 1.88 per cent nationally.

The total annual requirement for physicians in the United States during the period 1968-1980, as projected by the BLS would, therefore, be about 20,758 per year.

During the period 1964 to 1968, our medical schools were producing an average of 8,200 physicians annually with an additional 1,800 foreign-trained physicians entering as in-migrants or 10,000 physicians per year in all.[3] This is about half of the projected 1968-1980 annual requirement of 20,758 as cited above. According to more recent figures,[4] the medical schools of the United States graduated 8,974 physicians in 1971 while the foreign physicians admitted as in-migrants, or as visitors, totaled 10,540, making a grand total of 19,514 which is somewhat less than the projected average annual need of 20,000.

The American Association of Medical Colleges foresees a first year class of 15,000 or more medical students by 1975[5] which suggests that the production of physicians by the medical schools of the United States will have begun to meet a large part of the BLS's projected need of 20,000 per year by 1980. This indicates that most of the projected shortage will have been met by the use of foreign medical school graduates in the interim but the problem for the 1980s may well be one of physician maldistribution combined with surplus conditions in some areas of specialization. This latter possibility may well be the basis for current hesitation on the part of the federal government to spend monies designed to bring about a permanent general expansion of medical school capacity.[6] The government is, instead, seeking to expend monies in such a way as to expand those medical schools that produce the much needed practitioner of general or family medicine through a safety valve approach to medical school support.[6]

Projections of Growth for Pennsylvania

As pointed out earlier, Pennsylvania is relatively well endowed with physicians in comparison with other states. It is, therefore, not likely that our growth needs will be as great as those for the United States as a whole. In fact, projections of growth for Pennsylvania's physicians under 70 years of age, made by the U.S. Bureau of Labor Statistics for the Bureau of Employment Security of the Commonwealth of Pennsylvania, indicate an overall growth of 33.4 per cent (33.5 per cent for M.D.'s and 31.6 per cent for D.O.'s) during the period 1970 to 1980. This is equivalent to an annual rate of 3.34 per cent for Pennsylvania during 1970-1980 as compared with an average of 4.38 per cent for the nation during the period 1968-1980, i.e., 52.6 per cent ÷ 12 = 4.38 per cent.

If Pennsylvania's total physician growth were proportionately the same as that projected for the Nation by the U.S. Bureau of Labor Statistics, then Pennsylvania would have 26,499 nonfederal physicians by 1980 (based on AMA figures for 1968) using the national growth rate of 52.6 per cent. In contrast, if the BLS growth estimate for Pennsylvania were used, then Pennsylvania would have 23,847 physicians (based upon AMA figures for 1970) using the growth rate of 33.4 per cent.

It should be noted here that the growth rate for Pennsylvania estimated by BLS was derived in the same manner (industry by occupation matrices) for the publication, **Tomorrow's Manpower Needs**, which in its latest review indicates a total growth of 48.5 per cent for physicians and surgeons and 43.7 per cent for osteopathic physicans, or a rate of 48.3 per cent, overall.[10] If this estimate for the nation is used on the 1970 Pennsylvania nonfederal physician figure, we obtain an estimate of 26,510 which is similar to the BLS figure, 26,499. It seems likely, then, that the total number of physicians arrived at in the present study will fall close to or within these values, i.e., between 23,847 and 26,510. In fact, the figure actually arrived at in this study is 25,901 (Table 36). This latter figure is well within the range given above. It represents an estimate based upon the aggregation of separate projections for each medical specialty plus modifications based upon anticipated future medical school output and in-migration during the 1970s.

Historical Growth Trends for Pennsylvania Physicians

It seems highly likely that medicine can be considered as actually a complex of related but somewhat independent sub-professions, i.e., medicine is highly specialized with differential growth patterns for each specialty. Specialty maldistribution was also considered as a likely problem. For these reasons separate projections for each specialty and for several categories of physicians were made for use in the present study.

The projections were based on the data for the years 1963 to 1970 and the AMA series **Distribution of Physicians in the United States**. Modification of the data for the years 1967 and earlier were made prior to projection. These modifications were based upon shifts in physician allocation for 1968 due to a changeover from an older classification system to a new one in that year.[8] If, for example, there were 780 physicians listed in a given specialty under the old classification in 1968 and only 540 under that specialty in the new 1968 tables given in the AMA publication **Reclassification of Physicians, 1968,**[8] then a correction factor of 69 per cent (540 ÷ 780 = 0.69) was used for data of years prior in order to make the figures in the time series more comparable. An assumption was made that the degree of change required in 1968 would not greatly differ from that which would have been required in any other previous year if the reclassification had taken place then.

As a first step in the projecting of physician growth, linear projections were made based on the now corrected historical data from the AMA's **Classification of Physicians** series (Appendix A). In some instances, however, the linear projection method seemed inappropriate to the data. Judgments as to trend were, therefore, made by a visual inspection of the data or a graph of a suspected nonlinear trend. In some instances, several alternative projections were made. The basis on which each projection was made is indicated on each of the tables of Appendix A.

Since the American Osteopathic Association does not publish a similar statistical series involving physician counts for specialties and type of activity, it was necessary to project the number of osteopaths during the 1960s into the 1970s and then estimate the number of direct care physicians in general practice, internal medicine, pediatric medicine and in general surgery using the proportions of such physicians found in the **1971 Directory of Osteopathic Physicians.**[9] The results of this procedure are in Table 33. Admittedly, actual counts could have been made but the pressure of time and lack of personnel made this impractical.

The Problem of Ahistorical Supply

It is obvious that projections of growth without regard to the impact of increases in medical school output and in-migration, due to demands and factors not operating in the historical past, must be, of necessity, in error to some degree. For this reason, an effort was made by the author to project what might be called ahistorical growth based upon the discrepancy between the number of physicians projected as supply in Tables 22a and 22b. This discrepancy is, in effect, the difference between the projection of supply if Pennsylvania physicians continued to be produced, be retrained and in-migrate at the same rate as in the 1960s (Table 22b) and the projections of supply based on the medical schools' conception of their future growth in the 1970s (Table 22a).

Table 34 contains historical trend medical physician and doctors of osteopathy supply projections subtracted from the survey-based supply projections in order to obtain the desired estimates of ahistorical medical physician and doctor of osteopathy supply. This table indicates that 479 more doctors of osteopathy and 1,936 more medical physicians will have entered active practice in Pennsylvania during the 1970s than would have entered if the medical schools' graduate output and the in-migration patterns remained as they were in the 1960s.

The estimates of ahistorical growth found in Table 34 will have a margin of error if the medical schools do not actually expand as they have indicated or if the retention rates of Pennsylvania trained and out-of-state trained physicians change markedly during the 1970s. These estimates are merely the best available without making blind assumptions about entry rate changes.

Table 35 is an attempt to combine the data of Table 34 together with the individual and aggregated projections of Table 33 (doctors of osteopathy) and of Appendix A in order to obtain final corrected growth estimates for Pennsylvania physicians.

In Table 35 projected historical growth trends are taken from either Appendix A or from Table 33 and then the cumulative values of the historical growth projection for that year (Table 34) are added in order to obtain final corrected projections of physician growth. The last column in Table 35 represents the final projections of physician growth (medical physician and doctors of osteopathy combined) that have been thus corrected for the probable impact of ahistorical medical school growth.

General physician growth estimates are also to be found in Table 36 which first gives the actual growth of Pennsylvania physicians for medical physicians only (for doctors of osteopathy see Table 33) and then gives projections of medical physicians and doctors of osteopathy growth from 1971 through to 1980 with appropriate ahistorical corrections. If the projections in Table 36 are correct, we should see the total physician figure for Pennsylvania rise from some 17,876 medical physicians and 1,601 doctors of osteopathy in 1970 (19,477 altogether) to a total of 25,901 by 1980, a 33 per cent increase in 10 years over the 1970 figure.

As pointed out earlier, this final figure of 25,901 is very close to that projected, using BLS and Tomorrow's Manpower Needs percentage growth estimate for the Nation.

General Comments

As may be seen in Table 37, a general pattern of improved population per physician ratios is projected in the 1970s for all categories of physician with the exception of general and family practice where the pattern is one of a rapidly decreasing number of physicians. Projected here is a deteriorating balance of general practice physicians to the Pennsylvania population through 1977, after which the situation begins to improve.

Inspection of the data in Table 35 indicates that the projected improvement beyond 1977, with regard to general practice, is largely attributable to a projected marked increase in the number of osteopathic physicians. Unfortunately, there is some question as to whether this development will aid the rural areas. Data available to the author[9] indicates that osteopathic physicians tend to practice in or near an established osteopathic hospital. It may be hypothesized that, despite the position of the AMA that their training is now equivalent to that of the medical physician (California recently passed legislation permitting osteopaths to be licensed as medical physicians), they will find it difficult to practice away from an osteopathic hospital because they are subject to a denial of access to nonosteopathic medical hospital facilities because of residual prejudice and, possibly, medical competitiveness.

Table 33

Historical Trend Based Projections of the Total Number of Doctors of Osteopathy in Pennsylvania with Estimates of Subtotals Based on Current 1971 Ratios[a]

Year	Total D.O.'s[b]	Estimated Active or Direct Care[c]	Estimated General Practice Total[d]	Estimated Internal Medicine Total[e]	Estimated Pediatrics Total[f]	Estimated General Surgery Total[g]	Estimated Other Specialties Total[h]
1960	1,357	988	636	47	26	52	226
1961	1,364	993	639	48	26	53	227
1962	1,393	1,014	653	49	26	54	232
1963	1,442	1,050	676	50	27	56	240
1964	1,449	1,055	679	51	27	56	242
1965	1,461	1,064	685	51	28	56	244
1966	1,487	1,083	697	52	28	57	248
1967	1,526	1,111	715	53	29	59	254
1968	1,550	1,128	726	54	29	60	258
1969	1,573	1,145	737	55	30	61	262
1970	1,601	1,166	751	56	30	62	267
				Projections			
1971	1,667	1,213	781	58	32	64	278
1972	1,666	1,213	781	58	32	64	278
1973	1,690	1,230	792	59	32	65	282
1974	1,716	1,249	804	60	33	66	286
1975	1,743	1,269	817	61	33	67	291
1976	1,770	1,289	830	62	34	68	296
1977	1,796	1,307	842	63	34	69	299
1978	1,823	1,327	855	64	35	70	304
1979	1,850	1,347	867	65	35	71	308
1980	1,877	1,366	880	66	36	72	313

[a] Actual known totals are underlined. All others are ratio estimates based on the 1971 data or are linear projections of the D.O. totals from 1960 to 1972.

[b] Taken from the totals of the American Osteopathic Association directories for the years 1960-1972 as listed in correspondence from the American Osteopathic Association.

[c] Estimates based upon the 1971 finding that 1,213 direct care D.O.'s is 72.8 per cent of the 1,667 D.O.'s listed for Pennsylvania.

[d] Estimates based on the 1971 finding that 781 is 64.4 per cent of the direct care figure of 1,213.

[e] Same as in note d but percentage is now 4.8 per cent.

[f] Same as in note d but percentage is now 2.6 per cent.

[g] Same as in note d but percentage is now 5.3 per cent.

[h] Same as in note d but percentage is now 22.9 per cent.

Table 34

Projection of Ahistorical Supply to be Used as a Correction Factor for Linear Growth Projections of Appendix A

All Active or Direct Care Physicians

Year	Historical Trend M.D. Supply Projection[a]	Survey Based M.D.Supply Projection[b]	Ahistorical M.D.Supply Projection[c]	Historical Trend D.O.Supply Projection[a]	Survey Based D.O.Supply Projection[b]	Ahistorical D.O. Supply Projection[c]
1971	550(440)[d]	604(472)[d]	54(32)[d]	60[e]	72[e]	12[e]
1972	555(444)	660(530)	105(86)	62	84	22
1973	559(449)	674(539)	115(90)	62	9[illegible]	30
1974	564(450)	720(577)	156(127)	64	99	35
1975	569(455)	738(589)	169(134)	65	100	35
1976	574(459)	794(637)	220(178)	67	113	46
1977	579(460)	819(657)	240(197)	68	126	58
1978	583(466)	858(687)	275(221)	70	142	72
1979	589(470)	885(707)	296(237)	72	157	85
1980	593(474)	899(720)	306(246)	73	157	84
Total	5,715(4,567)	7,651(6,115)	1,936(1,548)	663	1,142	479

General and Family Practice

Year	Historical Trend M.D. Supply Projection[a]	Survey Based M.D.Supply Projection[b]	Ahistorical M.D.Supply Projection[c]	Historical Trend D.O.Supply Projection[a]	Survey Based D.O.Supply Projection[b]	Ahistorical D.O. Supply Projection[c]
1971	80(80)	91(91)	11(11)	40	47	7
1972	81(81)	99(97)	18(16)	41	56	15
1973	81(81)	104(104)	23(23)	41	60	19
1974	81(81)	109(107)	28(26)	43	65	22
1975	84(82)	110(110)	26(28)	43	66	23
1976	84(82)	119(119)	35(37)	44	75	31
1977	84(82)	123(121)	39(39)	46	84	38
1978	89(87)	128(126)	39(39)	46	94	48
1979	89(87)	131(130	42(43)	47	104	57
1980	90(90)	137(136)	47(46)	49	104	55
Total	843(833)	1,151(1,141)	308(308)	440	755	315

Internal Medicine

Year	Historical Trend M.D. Supply Projection[a]	Survey Based M.D.Supply Projection[b]	Ahistorical M.D.Supply Projection[c]	Historical Trend D.O.Supply Projection[a]	Survey Based D.O.Supply Projection[b]	Ahistorical D.O. Supply Projection[c]
1971	68(61)	76(61)	8(0)	4	4	0
1972	68(61)	81(68)	13(7)	4	4	0
1973	68(62)	83(71)	15(9)	4	4	0
1974	69(63)	89(75)	20(12)	4	4	0
1975	69(63)	90(78)	21(15)	4	8	4
1976	69(63)	98(82)	29(19)	4	8	4
1977	69(63)	100(85)	31(22)	4	8	4
1978	74(66)	106(91)	32(25)	4	8	4
1979	74(66)	107(93)	33(27)	4	8	4
1980	74(66)	112(96)	38(30)	4	8	4
Total	702(634)	942(800)	240(166)	40	64	24

Table 34 (Continued)

Pediatrics

Year	Historical Trend M.D. Supply Projection[a]	Survey Based M.D.Supply Projection[b]	Ahistorical M.D.Supply Projection[c]	Historical Trend D.O.Supply Projections[d]	Survey Based D.O.Supply Projection[b]	Ahistorical D.O. Supply Projection[c]
1971	34(34)	39(39)	5(5)	2	4	0
1972	38(37)	43(41)	5(4)	2	4	0
1973	38(37)	45(45)	7(8)	2	4	0
1974	38(37)	48(47)	10(10)	2	4	0
1975	38(37)	48(47)	10(10)	2	8	4
1976	38(37)	50(50)	12(13)	2	8	4
1977	38(37)	54(53)	16(16)	2	8	4
1978	38(37)	56(54)	18(17)	2	8	4
1979	38(37)	59(58)	21(21)	2	8	4
1980	39(39)	59(58)	20(19)	2	8	4
Total	377(369)	501(492)	124(123)	20	64	24
General Surgery						
1971	60(55)	69(64)	9(9)	4	4	0
1972	62(57)	73(66)	11(9)	4	5	1
1973	62(57)	78(70)	16(13)	4	5	1
1974	62(57)	82(75)	20(18)	4	5	1
1975	62(57)	82(75)	20(18)	4	5	1
1976	62(57)	86(78)	24(21)	4	5	1
1977	62(57)	92(85)	30(28)	4	7	3
1978	62(57)	96(87)	34(30)	4	7	3
1979	62(57)	103(90)	41(33)	4	9	5
1980	69(64)	103(90)	34(26)	4	9	5
Total	625(575)	864(780)	239(205)	40	61	21
Other Specialties						
1971	318(236)	348(259)	30(23)	13	15	2
1972	321(23[illegible])	381(286)	60(49)	13	18	5
1973	322(240)	389(290)	67(50)	15	20	5
1974	325(241)	417(311)	92(70)	15	22	7
1975	327(243)	424(316)	97(73)	15	22	7
1976	330(246)	459(342)	129(96)	15	25	10
1977	334(247)	475(353)	141(106)	15	27	12
1978	337(250)	495(369)	158(119)	15	31	16
1979	339(251)	501(369)	162(118)	15	45	30
1980	342(254)	511(378)	169(124)	16	45	29
Total	3,295(2,445)	4,400(3,273)	1,105(828)	147	270	123

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[a] See Table 22b from which derived.

[b] See Table 22a from which derived.

[c] A simple subtraction of preceding raw data to get an estimate of supply growth that could not be accounted for in historical trend growth estimates of Appendix A for these specialties.

[d] The value in parentheses represents direct care physicians while the preceding figure represents active physicians, exclusive of interns and residents.

[e] Osteopaths are assumed to be in direct care if they are active.

Table 35

Projections of Pennsylvania Physician Totals (Growth) From 1971-80

Year	Historical Trend M.D. Projection[a]	Cumulative Ahistorical M.D.Growth Projection[b]	Historical Trend D.O. Projection[c]	Cumulative Ahistorical D.O.Growth Projection[b]	Projected Total Active Physicians
Active Practice					
1971	13,846	54	1,213	12	15,125
1972	14,084	159	1,213	34	15,490
1973	14,323	274	1,230	64	15,891
1974	14,559	430	1,249	99	16,337
1975	14,799	599	1,269	134	16,801
1976	15,039	819	1,289	180	17,327
1977	15,277	1,059	1,307	238	17,881
1978	15,519	1,334	1,327	310	18,490
1979	15,757	1,630	1,347	395	19,129
1980	15,991	1,936	1,366	479	19,772
Direct Care					
1971	12,135	32	1,213	12	13,392
1972	12,328	118	1,213	34	13,693
1973	12,521	203	1,230	64	14,023
1974	12,713	335	1,249	99	14,297
1975	12,907	469	1,269	134	14,779
1976	13,101	647	1,289	180	15,217
1977	13,294	844	1,307	238	15,683
1978	13,490	1,065	1,327	310	16,192
1979	13,682	1,302	1,347	395	16,726
1980	13,871	1,548	1,366	479	17,264
General and Family Practice					
1971	3,188	11	781	7	3,987
1972	3,099	27	781	22	3,929
1973	3,011	50	792	41	3,894
1974	2,922	76	804	63	3,865
1975	2,833	104	817	86	3,840
1976	2,744	141	830	117	3,832
1977	2,656	180	842	155	3,833
1978	2,567	219	855	203	3,844
1979	2,478	262	867	260	3,867
1980	2,390	308	880	315	3,893
Internal Medicine					
1971	1,335	0	58	0	1,393
1972	1,359	7	58	0	1,424
1973	1,384	16	59	0	1,459
1974	1,408	28	60	0	1,496
1975	1,432	43	61	4	1,540
1976	1,456	62	62	8	1,588
1977	1,481	84	63	12	1,640
1978	1,505	109	64	16	1,694
1979	1,529	136	65	20	1,750
1980	1,553	166	66	24	1,809

Table 35 (continued)

Pediatrics

Year	Historical Trend M.D. Projection[a]	Cumulative Ahistorical M.D.Growth Projection[b]	Historical Trend D.O. Projection[c]	Cumulative Ahistorical D.O.Growth Projection[b]	Projected Total Active Physicians
1971	594	5	32	0	631
1972	622	9	32	0	663
1973	649	17	32	0	698
1974	677	27	33	0	737
1975	704	37	33	4	778
1976	732	50	34	8	824
1977	759	66	34	12	871
1978	787	83	35	16	921
1979	814	104	35	20	973
1980	842	123	36	24	1,025
General Surgery					
1971	1,073	9	64	0	1,146
1972	1,103	18	64	1	1,185
1973	1,132	31	65	2	1,230
1974	1,161	49	66	3	1,279
1975	1,191	67	67	4	1,329
1976	1,220	88	68	5	1,381
1977	1,249	116	69	8	1,442
1978	1,279	146	70	11	1,506
1979	1,308	179	71	16	1,574
1980	1,337	205	72	21	1,635
Other Specialties					
1971	5,945	23	278	2	6,238
1972	6,145	72	278	7	6,502
1973	6,346	122	282	12	6,762
1974	6,545	192	286	19	7,042
1975	6,747	265	291	26	7,329
1976	6,949	361	296	36	7,642
1977	7,149	467	299	48	7,963
1978	7,352	586	304	64	8,306
1979	7,553	704	308	94	8,659
1980	7,749	828	313	123	9,013

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[a] For active and direct care physicians see Table 36 which is based on an aggregation of the projections of Appendix A. For the specialty areas themselves go to Appendix A directly.

[b] See Table 34 for projections of ahistorical supply.

[c] See Table 33 which projects the total number of Doctors of Osteopathy 1973-80 and then estimates the number of active, direct care, general practitioners, etc.

[d] Derived by subtracting the previous specialty area totals of this table from the direct care physician totals.

Table 36

Historical (Actual) and Projected Physicians in Pennsylvania Based Upon Aggregated Individual Projections from Appendix A

Actual

	1963	1964	1965	1966	1967	1968	1969	1970
Direct Patient Care[a]	10,975	11,111	11,078	11,270	11,357	11,580	11,692	12,016
Administration	520	538	531	570	591	570	610	601
Medical Teaching	210	226	267	284	309	307	305	324
Research	520	581	774	845	865	828	636	620
Other Activities	42	45	64	56	106	131	140	141
Interns	703	735	712	765	757	792	821	727
Residents	1,656	1,697	1,898	1,907	2,068	2,148	2,302	2,430
Inactive	1,238	1,211	1,167	1,126	1,098	1,009	1,078	1,017
Active Practice M.D.'s[c]	12,267	12,501	12,714	13,025	13,228	13,416	13,383	13,702
Total M.D.'s	15,864	16,144	16,491	16,823	17,151	17,365	17,584	17,876
Actual AMA Total[d]	16,030	16,278	16,602	16,814	17,163	17,365	17,584	17,876
Per Cent Deviance	-1.04	-0.82	-0.67	0.05	-0.07			

Projected

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Direct Patient Care	12,135	12,328	12,521	12,713	12,907	13,101	13,294	13,490	13,682	13,871
Administration[b]	623	636	649	661	674	687	699	712	725	737
Medical Teaching[b]	351	367	383	398	414	430	446	462	478	494
Research[b]	570	570	570	570	570	570	570	570	570	570
Other Activities[b]	167	183	200	217	234	251	268	285	302	319
Interns[b]	796	806	816	826	835	845	855	865	875	885
Residents[b]	2,514	2,626	2,737	2,848	2,960	3,071	3,183	3,294	3,405	3,517
Inactive[b]	960	925	891	856	822	787	753	718	684	649
Active Practice M.D.'s	13,846	14,084	14,323	14,559	14,799	15,039	15,277	15,519	15,757	15,991
Total M.D.'s	18,116	18,441	18,767	19,089	19,416	19,742	20,068	20,396	20,721	21,042
Projected Active D.O.'s[e]	1,213*	1,213*	1,230	1,249	1,269	1,289	1,307	1,327	1,347	1,366
Projected Active Physician Ahistorical Growth[f]	66	193	338	529	733	999	1,297	1,644	2,025	2,415
Total Active Physicians[g]	15,125	15,490	15,891	16,337	16,801	17,327	17,881	18,490	19,129	19,772
Estimated Total Physicians[h]	19,814	20,292	20,817	21,401	22,009	22,698	23,424	24,222	25,059	25,901

*Actual figures rather than projected.

[a] An aggregation of the direct patient care M.D. estimates for each specialty area found in Appendix A.

[b] See last portion of Appendix A for projections of M.D.'s in administration, medical teaching, etc.

[c] Interns, residents and inactive M.D.'s excluded.

[d] Totals actually published by the AMA used here for comparison with the total obtained by aggregating the corrected totals for 1963-1967 in Appendix A, i.e., see percentage deviance below.

[e] A projection of the number of doctors of osteopathy based upon data from the American Osteopathic Association for the 1960's (See Table 33).

[f] An estimate of active physician growth due to the projected increase in medical student output by Pennsylvania's medical schools and on assumption of similar increases in the other medical schools of the country. (See Table 35, e.g., 54 + 12 = 66, 159 + 34 = 193, etc.)

[g] Excludes interns and residents as well as inactives and manipulative therapy D.O.'s and assumes the ahistorical growth physician to be active physicians.

[h] Based upon 1970 finding that the 14,915 active physicians (13,702 M.D.'s and 1,213 D.O.'s) is 31 per cent less than the 19,543 physician total (17,876 M.D.'s and 1,667 D.O.'s) for 1970, i.e., 19,543 ÷ 14,915 = 1.31, which can be used as an estimation factor, e.g., 1.31 times 15,125 equals 19,814.

Table 37

Population Per Physician Ratios Based on the Projections of Growth in Table 35[a]

Year	Active Practice	Direct Patient Care	General and Family Practice	Internal Medicine	Pediatrics	General Surgery	Other Specialties	All Physicians[b]
1971	790	892	2,996	8,576	18,933	10,424	2,009	603
1972	768	869	3,029	8,357	17,950	10,043	1,830	586
1973	752	852	3,069	8,192	17,124	9,717	1,768	574
1974	735	839	3,105	8,021	16,282	9,382	1,704	561
1975	717	815	3,136	7,820	15,480	9,062	1,643	547
1976	697	794	3,153	7,608	14,661	8,748	1,581	532
1977	677	772	3,160	7,386	13,907	8,400	1,521	517
1978	657	750	3,158[c]	7,166	13,180	8,060	1,461	501
1979	636	727	3,144	6,947	12,495	7,724	1,404	485
1980	616	705	3,126	6,728	11,874	7,444	1,350	470

[a] From Senier and Mulvihill, "1971-1980 Population Projections for Pennsylvania, Counties and Major Cities," Division of Applied Research, Bureau of Educational Research, Pennsylvania Department of Education, 1972.

[b] Based on projections at the bottom of Table 36.

[c] A change in trend from undesirable to desirable due to the impact of the projected increased output of the medical schools even though an increase in rate of entry into general or family medicine has not been assumed.

There can be no doubt, however, that in many areas of the state the osteopaths are now providing basic care that would not otherwise be available. This is so indicated by Table 6 of this report where we see that 1 per cent of the medical physician graduates of 1961-63 entered into the practice of family medicine in Pennsylvania (a new specialty) and another 5 per cent remained as general practitioners. In contrast, we find in Table 6 that 30 per cent of the Philadelphia College of Osteopathic Medicine graduates of 1961-63 remained in Pennsylvania as general practitioners. This indicates that future increases in the number of osteopathic graduates will have a larger effect on increasing the availability of basic care than would an equivalent numerical increase in the output of medical physician graduates assuming no marked change in the medical physician retention rate figure.

Medicine in a State of Flux

American medicine is now in a period of rapid flux both technologically and in terms of changing demand patterns and, furthermore, is likely to remain so. As a consequence, precise projections of physician growth are rendered somewhat difficult at the medical specialty level. New specialties in medicine are constantly emerging in response to the changing technology and demand patterns, and we have no historical precedent to guide us as to the rate of their probable future growth. We can be sure, however, that they will bring about a further reallocation of physicians and thus reduce the number of physicians available for basic care and the older areas of strong specialization. For example, the rapidly increasing concern about the quality and amount of emergency care[11,12] is likely to bring about considerable growth of emergency care as a specialty itself. A rapidly increasing use of nuclear radiation in medicine has created new specialties in radiology, and there is no reason to believe that such things as computers, laser technology, etc., will not continue to bring about other new specialties. Certainly, biomedical and bioengineering research specialties are likely to emerge increasingly as we continue to seek mechanical and electronic solutions to such problems as the loss of limbs or the senses, the effect of nerve induced paralysis and the loss of functions in such organs as the heart, liver and kidneys.

Family Medicine as an Emerging Specialty

A dramatic, but as yet unrealized, change in basic care may be brought about by the recent emergence of family medicine as a specialty. Although this specialty of family medicine is included in the 1971 **AMA** tapes that provided some of our data, the specialty of family medicine is itself so new that the most recent (1970) issue of the **Distribution in the Physicians in the United States** does not list it as a specialty in its tabulations. The AMA tapes indicate, however, that the number of practitioners of family medicine in the state, as of 1971, was, in fact, very small, i.e., 102, and represented only 3.1 per cent of the same 3,285 doctors in the United States who were charter diplomats of the American Board of Family Practice.

In order to achieve the status of a certified specialist in the discipline of family medicine, the aspiring physician must first complete a three-year family practice residency or must have been a practitioner of family medicine for a minimum of six years and have successfully completed 300 hours of postgraduate medical education. He must then take the written examination given by the Board of Family Practice. Every six years he must repeat this written examination in order to be recertified,

Alone of all medical certifying boards, the Board of Family Practice had, at its creation, no *grandfather* clause designed to allow practicing physicians to automatically become diplomates. Furthermore, none of the other specialty boards have required that their diplomates prove their competence on a continuing basis. There can be no doubt, therefore, that there is a real difference between the practitioner of the specialty called family practice and the general practitioner. The physician in general practice is able to enter practice immediately upon completing his internship and is not required to meet any other certifying standards.

Diplomate status in this newest of the specialties requires the passing, every six years, of an intensive two-day written examination in the areas of internal medicine, surgery, obstetrics-gynecology, pediatrics, psychiatry, preventative medicine and other traditional specialties in addition to the three years of residency following internship.

Despite its recognition by the AMA as a certified specialty, the future of the specialty of family practice must be considered as uncertain. Three questions are, as of now, unanswered. First, will the general public recognize that such physicians do actually differ from the ordinary general practitioners in their training and their presumed competence? Second, will the medical profession as a whole give due recognition and status to these physicians as true specialists? Third, will the medical students themselves choose to enter into this upgraded version of general practice with its much more rigorous requirements?

As to the last question, it is, of course, too soon to say for certain, but it is interesting to note that despite the emphasis upon family medicine as a justification for the creation of the Hershey Medical School, only 4 of the 33 graduates of 1971 had indicated family medicine as their goal in response to a survey one year later (Tables 86 and 87). This survey was carried out by the Hershey Medical School and the data made available to the author for analysis.

In light of the above, it should, therefore, be remembered that the projections of growth for general practice in this study may well have to be modified in the future if the specialty of family practice begins to represent a larger share of the basic care physician total and as historical data suitable for trend analysis become possible.

The present projections of growth found in this chapter will be used later in Chapter XI, in order to derive projections of replacement demand due to growth. This will be a part of that chapter's effort to interface all demand and supply projections in order to obtain projections of physician need.

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CHAPTER IX

DEMAND DUE TO UNMET NEEDS

The true need for physicians is not easily determined. It will vary as our delivery system varies and as the productivity of the individual physician varies due to improved technology and an increased use of auxiliary paramedical personnel. In addition, physicians themselves are, to some degree, creators of their own demand since they control the number of patients seen (time per patient, frequency of patient visits, office hours, etc.), the amount of treatment or surgery prescribed, etc.

It seems obvious, then, that a projection of probable growth plus replacement demand due to death, retirement, etc., will not suffice if, in fact, the supply of physicians is reduced by constraints on the number of physicians trained due to factors other than physician demand, actual or potential. Potential demand may be defined as demand that would materialize as a consequence of any change in the delivery system that would make medical care more freely available or less costly, e.g., the advent of Medicaid and Medicare or the introduction of national health insurance. Such elimination of financial or other barriers to medical care must inevitably lead to an increased level of demand for services by the poor, the aged and, in general, all those who previously put off medical care for financial and other reasons.

Actual or present demand, in contrast, may be taken to mean the demand for medical care that is not now being met but is indirectly reflected by demands for service in the form of long waiting room lines, difficulties in obtaining an appointment, etc.

These two types or levels of demand can be estimated if one can obtain criteria that would indicate an adequate or optimum degree of medical service would exist under each of two possible situations. What is needed is some way of judging whether we have enough physicians of a given specialty to meet the criterion of optimum care in, first, the present system of medical delivery and, second, a universal system of medical delivery that makes full use of the potential of paramedical personnel and prepaid group practice for increased physician productivity, along with full spectrum quality medical care.[1,2,3]

In the course of preparing this study, efforts were made to utilize data on patient visits per week, physician working hours, etc., to estimate how many physicians would be required to serve a given number of people. Unfortunately, these efforts were not successful because an estimate of the average number of individual patients treated one or more times in a given year by a given type of physician could not be derived from the data, and no direct study of patient load in terms of the average number of individuals recorded as being treated in a given year had been found.

Fortunately, an alternative was found in the survey carried out by the publication **Medical Economics**[4] where professionals in a given specialty were surveyed as to what they believed to be a desirable population to physician ratio for good medical care. In addition, estimates were obtained from federal and other sources which used different methods to arrive at estimates of desirable or optimum physician ratios for our present medical system. The journal then presented its findings in the form of the median estimate for all of the information sources covered by its survey.[4] These median ratios are reprinted in Table 38 of this report by permission of the publishers of **Medical Economics**. For those specialties for which no optimum ratio was given, the author of this study made arbitrary estimates based upon the data available for the other specialties in Table 38.

For comparative purposes, and to illustrate the kind of ratios used by various writers to estimate need under our current delivery system, ratios for the United States in general, for New York, the highest state, and for Pennsylvania are also given in Table 38. Comparison of the various state ratios with the optimum ratios from **Medical Economics**[4] suggests that specialties such as general practice must be in stronger demand than are some other specialties where the optimum figure is more closely approximated by the state ratios.

In addition, Table 38 lists the population per physician ratios that have been developed by those prepaid group medical plans whose membership most closely approximates that of the general United States population at all age levels. As can be seen, these prepaid plan ratios are substantially lower, by and large, than the ratios suggested by the **Medical Economics** study. In a sense, they substantiate the findings of those who have suggested that greater physician productivity and, hence, lower physician requirements would be characteristic of this type of delivery system.[2,3]

Table 38

A Summary of Population Per Physician Ratios for Possible Use As Estimators of True or Unmet Need for Active Patient Care Physicians

Specialty	Health Insurance Plan[a]	Kaiser-Puget Sound[b]	Medical Economics Survey[c]	1970 U.S. Ratio[d]	1970 Median State Ratio[e]	1970 Penna. Ratio[d]
Allergy			25,000	142,058		112,323
Anesthesiology		30,562	15,000	24,368	29,444	33,411
Cardiology			100,000	46,288		37,560
Colon & Rectal Surgery			(200,000)[g]	326,940	213,636	235,878
Dermatology	100,000	32,930	50,000	67,308	72,000	79,154
Gastroenterology			(100,000)[g]	165,753		149,290
General Practice/ Family Practice	6,736	3,397	2,000	3,809	3,459	3,594
General Surgery	16,666	17,324	10,000	10,342	8,223	11,297
Internal Medicine	4,114	7,510	5,000	8,040	6,333	7,455
Neurology			75,000	141,460	125,000	145,604
Neurosurgery		54,839	100,000	113,518	104,166	138,752
Obstetrics-Gynecology	9,090	9,770	11,000	13,874	14,299	13,826
Ophthalmology	33,333	47,552	20,000	25,825	26,129	23,971
Orthopedics	25,000	29,694	30,000	29,600	26,538	37,205
Otolaryngology	50,000	38,857	25,000	50,055	48,552	45,015
Pathology		47,552	20,000	39,827	30,286	38,045
Pediatrics	4,545	9,031	10,000	17,508	17,000	20,874
Plastic Surgery			50,000	165,753	188,000	203,343
Psychiatry	50,000		10,000	13,579	16,730	13,619
Pulmonary Disease			(150,000)[g]	157,349		173,440
Radiology	25,000	30,562	15,000	22,835	19,285	20,619
Thoracic Surgery			100,000	149,645	182,500	170,926
Urology	100,000	44,590	30,000	45,300	43,800	45,187
All Physicians	1,000	1,070	635[f]	791	964	982

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[a] Health Insurance Plan optimums published in Journal of American Medical Association, March 20, 1972, 219, No. 12. Used here because age distribution of its 780,000 subscribers in Greater New York close approximates that of the general United States population. (See Mason, Henry R., Manpower Needs By S ialty, pp. 1621, 1626.

[b] Kaiser-Permamente Prepayment Plan located at Puget Sound, Washington. Data from source quoted in not above. Age distribution similar to but not identical to that of the general population.

[c] Data from the journal, Medical Economics, which is being used here with the permission of the publish and may not be reproduced elsewhere, in whole or in part, without their prior permission. Copyrighte by Medical Economics Company, Oradell, New Jersey, reprinted by permission. Figures in parentheses a arbitrary estimates by the author of this study.

[d] Based upon the 1970 census population estimate and the number of physicians in this specialty who are not in residency or internship programs as listed in the 1970 edition of the Distribution of Physicians in the United States published by the AMA.

[e] See reference in note a.

[f] The ratios for each specialty were divided into an arbitrary population figure of 100,000. The total of the resulting estimates was then divided into 100,000 to get the all physician estimate shown, i.e., 635.

[g] Figures in parentheses are arbitrary estimates by the author of this study.

Projections of Unmet Need

The discrepancy between projected estimates of the number of physicians needed to meet the optimum ratios of Table 38 and the projections of probable physician growth made earlier should result in projections of the number of physicians still needed in any given year to meet the optimum care standards implied by the ratios of Table 38.

In Table 39, projections of true need are found for various categories of physicians. True need is the total number of physicians in that category or specialty that Pennsylvania would have to have in order to meet the optimum ratio standards (**Medical Economics** based) of Table 38. The optimum ratio based entries of Table 39 were derived by dividing the optimum ratio for a given specialty into projections of Pennsylvania population made by Senier and Mulvihill.[5]

Table 39 indicates, for example, that, by 1980 the state should ideally have 6,085 practitioners of general medicine, 2,434 practitioners of internal medicine, 1,217 pediatricians, etc.

In Table 40, an effort has been made to estimate unmet need in 1980 for the physician catagories used throughout this report based upon the data in Table 39. The ratio of 643:1 which has been used in Table 40 to estimate the number of direct care physicians required to meet Pennsylvania's optimum care needs is simply a resultant of combining all of the specialties in Table 39. For the category of other specialties, combined data from Table 39 were again used with general practice, internal medicine, pediatrics and general surgery deleted in arriving at a ratio of 1,529:1.

Table 41 is the result of computing the difference between the optimum physician figures of Table 39 and matching projected growth estimates from Table 35. Data in Table 41 indicate that, by 1980, there will be a surplus situation with regard to the specialty of general surgery as well as for the more specialized fields in general. This should be true if the median optimum ratios arrived at in the **Medical Economics** survey[4] are reasonably valid. For example, in Table 41 a surplus of 418 general surgeons by 1980 contrasts markedly with the sizable shortage of 2,192 general and family practice physicians by that year.

Since Table 41 suggests that surpluses might well exist in the near future for the more specialized areas, it was thought worthwhile to attempt to estimate roughly which of these specialties might be likely to be responsible for any surplus condition. It is highly unlikely that these surplus physicians will actually enter into practice in Pennsylvania. Table 41 suggests that, in the future, an even greater proportion of the physicians trained by us at such a high cost will not remain in the state. A poorer holding rate will certainly result unless these future physicians can somehow be rerouted into the areas of greater need. The instructional cost of educating these physicians is now approximately $5,582 per year per equivalent full-time medical student and is likely to increase with time according to information received from the Bureau of Budget and Evaluation of the Pennsylvania Department of Education. (see Appendix F)

Table 42 attempts to correct the estimates of growth found in Appendix A in order to estimate unmet need for the category of other specialties. It can be readily seen in Table 42 that certain specialties seem to be primarily responsible for the indicated overall surplus of highly specialized physicians. Cardiology itself seems to be the main determiner of the surplus finding. According to the findings in Table 42, cardiology would have, by 1980, a figure over three times as great as that which would be optimum for that year (322%). This surplus may possibly be, to some degree, in error, however, since we cannot really be certain that the respondents and data sources used by the journal of **Medical Economics** defined a cardiologist, or pediatric cardiologist, in the same manner as did the American Medical Association. Assuming, however, that these sources did agree on the definition of a cardiologist, Pennsylvania will, in 1980, have a surplus of cardiologists unless the past trend toward specialization in this area changes to a lower rate.

Aside from the, possibly anomalous, specialty of cardiology, we find that the following specialties, along with general surgery, may have a surplus (Table 42) by 1980: neurology, neurosurgery, obstetrics-gynecology, opthalmology, orthopedics and psychiatry. In addition, the following specialities may be very close to a surplus: gastroenterology, pulmonary disease, radiology, thoracic surgery, urology and, to a lesser degree, pathology.

The specialty shortage areas for 1980 would seem to be: allergy, anesthesiology, colon and rectal surgery, dermatology, otolaryngology and plastic surgery, with allergy and plastic surgery in a state of markedly greater shortage than the others. Apparently, these specialties, along with general or family practice, internal medicine and pediatrics, will still be areas of some concern for the 1980s.

Table 39

Projections of True Need Based Upon Median Optimum
Ratios of Population Per Physician (M.D.)

Year	Actual 1970 and Projected Pa. Population	General Practice	Internal Medicine	Obstetrics-Gynecology	Pediatrics	General Surgery	Ophthalmology	Oto-laryngology	Allergy	Anesthesiology	Cardiology
1970	11,793,909[a]	5,897	2,359	1,072	1,179	1,179	590	472	472	786	118
1971	11,846,420[b]	5,923	2,369	1,077	1,185	1,185	592	474	474	790	118
1972	11,900,608	5,950	2,380	1,082	1,190	1,190	595	476	476	793	119
1973	11,952,261	5,976	2,390	1,087	1,195	1,195	598	478	478	797	120
1974	12,000,026	6,000	2,400	1,091	1,200	1,200	600	480	480	800	120
1975	12,043,124	6,022	2,409	1,095	1,204	1,204	602	482	482	803	120
1976	12,080,981	6,040	2,416	1,098	1,208	1,208	604	483	483	805	121
1977	12,112,951	6,056	2,423	1,101	1,211	1,211	606	485	485	808	121
1978	12,138,767	6,069	2,428	1,104	1,214	1,214	607	486	486	809	121
1979	12,158,037	6,079	2,432	1,105	1,216	1,216	608	486	486	811	122
1980	12,170,681	6,085	2,434	1,106	1,217	1,217	609	487	487	811	122
Optimum Ratio Value[c]		2,000:1	5,000:1	11,000:1	10,000:1	10,000:1	20,000:1	25,000:1	25,000:1	15,000:1	100,000:1

Year	Dermatology	Neurology	Neuro-Surgery	Psychiatry	Orthopedic Surgery	Pathology	Plastic Surgery	Radiology	Thoracic Surgery	Urology
1970	236	157	118	1,179	393	590	236	786	118	393
1971	237	158	118	1,185	395	592	237	790	118	395
1972	238	159	119	1,190	397	595	238	793	119	397
1973	239	159	120	1,195	398	598	239	797	120	398
1974	240	160	120	1,200	400	600	240	800	120	400
1975	241	161	120	1,204	401	602	241	803	120	401
1976	242	161	121	1,208	403	604	242	805	121	403
1977	242	162	121	1,211	404	606	242	808	121	404
1978	243	162	121	1,214	405	607	243	809	121	405
1979	243	162	122	1,216	405	608	243	811	122	405
1980	243	162	122	1,217	406	609	243	811	122	406
Optimum Ratio Value[c]	50,000:1	75,000:1	100,000:1	10,000:1	30,000:1	20,000:1	50,000:1	15,000:1	100,000:1	30,000:1

[a] U. S. Census, 1970.

[b] This figure and succeeding population estimates are from the study *1971-1980 Population Projections for Pennsylvania, Counties and Major Cities*, by John K. S. Senier and Philip J. Mulvihill of the Bureau of Educational Research, Department of Education, Commonwealth of Pennsylvania, 1972.

[c] Taken from *Medical Economics*, October 30, 1967 in article entitled "How Many People to Support a Specialist?" Values shown are medians for the various sources surveyed. Copyright 1967 by Medican Economics Company, Oradell, New Jersey.

Table 40

Approximated Unmet (True) Need for
Direct Care and Other Specialties

Year	Direct Care Optimum[a]	Projected Direct Care Totals[b]	Direct Care Unmet Need	Other Specialties Optimum[c]	Projected Other Specialties Totals[b]	Other Specialties Unmet Need
1971	18,424	13,392	5,032	7,753	6,238	1,515
1972	18,508	13,693	4,815	7,788	6,502	1,286
1973	18,588	14,023	4,565	7,822	6,762	1,060
1974	18,663	14,297	4,366	7,853	7,042	811
1975	18,730	14,779	3,951	7,882	7,329	493
1976	18,788	15,217	3,571	7,906	7,642	264
1977	18,838	15,683	3,155	7,927	7,963	(36)[d]
1978	18,878	16,192	2,686	7,944	8,306	(362)
1979	18,908	16,726	2,182	7,957	8,659	(702)
1980	18,928	17,264	1,664	7,965	9,013	(1,048)

[a] Based upon the ratio of 643:1 which was derived from Table 39 by adding up the 1980 unmet need projections over all listed specialties, e.g., 12,170,681 population divided by a total of 18,916 equals 643 (rounded off).

[b] Taken from Table 35.

[c] Based upon the ratio of 1,528:1 which was derived as in note a above by deleting the optimum totals in Table 39 for general practice, internal medicine, pediatrics and general surgery.

[d] Indicates more specialists would be available than optimally needed from 1977 on, i.e., a surplus of physicians in many of the specialties.

Table 41

Projections of Unmet (True) Need for Selected Medical Specialties (Basic Care) and All Physicians in Direct Patient Care[a]

Year	Direct Patient Care[b]	General/ Family Practice[c]	Internal Medicine[c]	Pediatrics[c]	General Surgery[c]	Other Specialties[b]
1971	5,032	1,936	976	554	39	1,515
1972	4,815	2,021	956	527	5	1,286
1973	4,565	2,082	931	497	(35)[d]	1,060
1974	4,366	2,135	904	463	(79)	811
1975	3,951	2,182	869	426	(125)	493
1976	3,571	2,198	828	384	(173)	264
1977	3,155	2,223	783	340	(231)	(36)[d]
1978	2,686	2,225	734	293	(292)	(362)
1979	2,182	2,212	682	243	(358)	(702)
1980	1,664	2,192	625	192	(418)	(1,048)

[a] All figures based upon direct patient care physician estimates.

[b] Taken from Table 40.

[c] Each value is the resultant of subtracting the projected figure of Table 35 from the optimum number given in Table 39, e.g., for internal medicine in 1971, 2,369 - 1,393 = 976.

[d] The values in parentheses represent surplus physicians rather than unmet need.

Table 42

An Approximation of Specific Unmet Other Specialties Need or Surplus Patterns in 1980

Specialty	1980 Optimum[a]	Projection from Appendix A[b]	Corrected Projection	Unmet Need	Surplus	Percentage Deviation from Optimum
Allergy	487	146	161	326	-	- 67
Anesthesiology	811	475	523	288	-	- 36
Cardiology	122	468	515	-	393	322
Colon & Rectal	(61)[d]	39	43	18	-	- 30
Dermatology	243	153	168	75	-	- 31
Gastroenterology	(122)	123	135	-	13	- 11
Neurology	162	148	163	-	1	1
Neurosurgery	122	122	134	-	12	10
Obstetrics/Gynecology	1,106	1,089	1,198	-	92	8
Ophthalmology	609	578	636	-	27	4
Orthopedics	406	440	484	-	78	19
Otolaryngology	487	287	316	171	-	- 35
Pathology	609	442	486	123	-	- 20
Plastic Surgery	243	80	88	155	-	- 64
Psychiatry	1,217	1,266	1,393	-	176	14
Pulmonary Disease	(81)	75	83	-	2	- 2
Radiology	811	726	799	12	-	- 2
Thoracic Surgery	122	105	116	6	-	- 5
Urology	406	323	355	51	-	- 13

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[a] Computed on basis of the published optimum Medical Economics ratios found in Table 39 divided into a projection of Pennsylvania's 1980 Population published by Senier and Mulvihill (1972).

[b] Taken from the historical trend projections of Appendix A. Assumes that the osteopaths make a negligible contribution to the specialties listed.

[c] The figures in this column are rough estimates based upon the overall growth of 10 per cent attributable to projected medical school growth over and above their historical growth.

[d] Figures in parentheses represent arbitrary estimates of need based upon the data available for other specialties and the growth figures for the specialty.

Unmet Need if Medical Schools Do Not Expand as Planned

Table 43 is the result of an effort to determine the degree of surplus for all areas of medicine, should the medical schools be unable to expand as they now project and, instead, simply expand much as they did in the 1960s

The surplus areas in Table 43 are, of course, fewer in number than in Table 42, i.e., cardiology, gastroenterology, general surgery, neurosurgery, orthopedics and psychiatry. The areas where the number of specialists in 1980 will closely but not quite approximate the optimum (80 per cent of optimum or better) are: neurology, obstetrics-gynecology, opthalmology, pulmonary disease, radiology, thoracic surgery and urology.

As might be also expected, the unmet need values are higher and there are more areas of unmet need than in Table 42. For example, 2,815 more general or family practice physicians are projected as still needed by 1980 in Table 43 while the earlier figure for this field of practice was 2,192 (Table 41).

Effect of Delivery System Change Upon True Need

We cannot, of course, foresee the actual changes in the medical delivery system that will be forthcoming in the future, but there can be little doubt that such changes are coming unless the problem of rapidly rising medical costs is solved.

It seems reasonable to suppose that much of the change, when it does come, will involve an emphasis on cost effectiveness and lowered economic barriers to quality care. Two of the most promising concepts, in this regard, are the use of paramedical personnel (physicians' assistants, etc.) to increase physician productivity and the Health Maintainance Organization. The HMO concept is modeled after the prepaid group plan of the Kaiser-Permanente variety and is intended to increase the availability of quality care in rural and urban center areas.

Past experience with the prepaid group plans now in existence may be viewed as a basis for estimating the likely need for physicians when paramedicals are used in a cost efficient group setting that is designed to provide wide spectrum quality medical care to the general public without prohibitive monetary barriers.

As a basis for such estimations, Table 44 summarizes the population to physician ratios that have been found to be optimum for two well known prepaid group plans whose membership approximates the general population in their age distribution. The data for the two plans are combined in Table 44 in terms of physician per 200,000 population. A generalized prepaid group (HMO) optimum ratio is then computed in terms of a population per physician ratio. The ratio for general and family medicine is 4,516:1 in Table 44. This contrasts strongly with a figure of 2,000:1 from the journal of Medical Economics survey[4] data. It is obvious that these prepaid plans are indeed able to increase the productivity of their general practitioners and delegate patients efficiently to paramedicals or other specialists in such a manner as markedly to decrease the need for family physicians if equivalent quality of care can be assumed. It is also apparent that these two plans are using internists and general practitioners almost interchangeably since when they are combined, the physician per 100,000 ratios become much alike for the two plans, i.e., 39.16 vs. 42.76 or a difference of 3 to 4 physicians rather than differences of 11 to 14 physicians in the case of internists and general/family practitioners, respectively.

The combination of the two specialties , internal medicine and general/family practice, results in a final population per physician ratio of 2,441:1 which is somewhat more favorable with regard to physician needs than the earlier 2,000:1 figure from the Medical Economics.[6] The 5,000:1 figure for internal medicine from that journal does not seem relevant here. Apparently the prepaid group plans have already done what is predicted for the future in an article *Forecast For Internists: a G.P.'s Life--More and More They Will Be Taking Over the G.P.'s Primary Care.* [6]

The ratios in Table 44 for pediatrics and general surgery are interesting to compare. The ratio for general surgery in Table 44 is 17,227, a much higher figure than the Medical Economics survey[4] figure of 10,000:1 cited earlier. The population per physician ratio for pediatricians is 6,048:1, a substantially lower figure than the figure of 10,000:1 arrived at in the Medical Economics survey.[4] Apparently, the prepaid group plans reduce the amount of surgery required. Possibly, they achieve this by the practice of preventative medicine and by eliminating all unnecessary surgery.

Prepaid plans apparently make a greater use of pediatricians than the present delivery system would

Table 43

Estimates of Unmet Specialty Needs in 1980 if the Growth of Physicians Continues in the 1970s as It Had in the 1960s

Specialty	1980 Optimum[a]	Projections from Appendix A[b]	Unmet Need	Surplus	Percentage Deviation From Optimum
Allergy	487	146	341		- 70
Anesthesiology	811	475	336		- 41
Cardiology	122	468		346	284
Colon & Rectal	(61)	39	22		- 36
Dermatology	243	153	90		- 37
Gastroenterology	(122)	123		1	1
General/Family Practice	6,085	3,270[c]	2,815		- 46
General Surgery	1,217	1,409[c]		192	16
Internal Medicine	2,434	1,619[c]	815		- 33
Neurology	162	148	14		- 9
Neurosurgery	122	122	0	0	0
Obstetrics/Gynecology	1,106	1,089	17		- 2
Ophthalmology	609	578	31		- 5
Orthopedics	406	440		34	8
Otolaryngology	487	287	200		- 41
Pathology	609	442	167		- 27
Pediatrics	1,217	878[c]	339		- 28
Plastic Surgery	243	80	163		- 67
Psychiatry	1,217	1,266		49	4
Pulmonary Disease	(81)	75	6		- 7
Radiology	811	726	85		- 10
Thoracic Surgery	122	105	17		- 14
Urology	406	323	83		- 20

[a] From Tables 39 and 42.

[b] Linear projections of historical data as found in Table 35 and in Appendix A. Assumes D.O.'s negligible in most specialties.

[c] Includes doctors of osteopathy as derived from Table 35.

Table 44

Estimates of Basic Care and Direct Patient Care Optimum Ratios for Prepaid Group Insurance Medical Delivery Systems Covering the General Population

Specialty	Health Insurance Plan[a]	Puget Sound[b]	HIP Physicians Per 100,000	Puget Physicians Per 100,000	Total Physicians Per 200,000	Optimum Ratio
General/Family	6,736	3,397	14.85	29.44	44.29	4,516
Internal Medicine	4,114	7,510	24.31	13.32	37.63	5,315
Subtotal			39.16	42.76	81.92	2,441[d]
General Surgery	16,666	17,824	6.00	5.61	11.61	17,227
Pediatrics	4,545	9,031	22.00	11.07	33.07	6,048
Opthalmology	33,333	47,552	3.00	2.10	5.10	39,216
Otolaryngology	50,000	38,857	2.00	2.57	4.57	43,764
All Direct Care[c]	1,000	1,070	100.00	93.46	193.46	1,034

[a] Health Insurance Plan optimums published in Journal of American Medical Association, March 20, 1972, Vol. 219, No. 12. Used here because age distribution of its 780,000 subscribers in Greater New York closely approximates that of the general United States population. (See Mason, Henry R., Manpower Needs By Specialty, pp. 1621-1626.)

[b] Kaiser-Permamente Puget Sound Plan in Washington State cited in Journal of American Medical Association issue of March 20, 1972 (see note "a" above). Also chosen because it approximates, but less closely in over 65 age bracket, the age distribution for the U.S.A. The age distributions are given in the article cited.

[c] This is for direct care physicians likely to be part of such a plan. Anesthesiologists, neurosurgeons, pathologists, psychiatrists and physiatrists may not be included in a given plan. These plans do include dermatologists, family practitioners, general surgeons, internists, obstetricians and gynecologists, ophthalmologists, otolaryngologists, orthopedists, pediatricians, radiologists and urologists. Neurologists and plastic surgeons are not included in either plan though some plans do include them.

[d] This ratio is not a subtotal but rather is computed from the subtotal in the preceding column, i.e., 200,000 ÷ 81.92 = 2,441. It represents a mix of general/family practice and internal medicine with internists apparently considered as roughly equivalent to general/family practitioners in the prepaid systems since the ratios of one to the other are near to being an exact reverse of each other (15:24 compared to 13:29).

seem to regard as optimum and viable. The strong emphasis upon preventative as well as curative care in these plans might well account for these ratio differences when combined with the economies inherent in the operation[2,3] of such plans.

As indicated in Table 44, approximately 1,000 people per physician (1,034 to be exact) are typically handled under these plans. Note C indicates, however, that these plans do not include physicians over the full range of specialization. Efforts to estimate present physician shortages using this figure of 1,000:1 are, therefore, suspect as unduly conservative, if only for this reason. For example, the 50,000 physician shortage figure arrived at by the federal government (See Appendix E) was, in part, based upon this rather optimistic prepaid plan ratio. It is doubtful that the present medical delivery system is that efficient nor is it likely to become so in the near future. The true population per physician optimum figure is, therefore, likely to be much lower, say, 643 persons per direct patient care physician as in Table 40.

The Impact of a Full-Scale Change to HMO's

Tables 45 through 47 represent an attempt to project the impact of a full-scale shift from the present delivery system to one resembling the prepaid group systems cited in Table 44. It compares these projections with those based on the **Medical Economics** article cited earlier.[4]

In the case of general/family practice and internists, combined, Table 45 reveals that the large projected need figures for these basic entry physicians under the present delivery system criterion standards (**Medical Economics** survey) would change into surplus estimates under the standards of the prepaid group plans of Table 44. In effect, it suggests that the current shortages of basic care physicians could conceivably be erased by the efficiencies that are said to be inherent in these plans.[2,3] One has to assume, of course, that such plans do give equivalent or better care than that now obtainable. For rural and central city dwellers this might easily be the case. Furthermore, the possibility of preventative as well as curative and palliative treatment being provided by such plans cannot be ignored with regard to any segment of the population, however well to do, since the conventional medical system now does very little in this area of preventative care.

Table 46 indicates that the optimum prepaid plan standards for pediatricians would require many more pediatricians than our present delivery system requires. However, the number needed would decline to a figure of 987 by 1980 if we then had this type of medical delivery system as our standard pattern.

Table 47 indicates that the reduced use of general surgeons under prepaid group insurance (HMO) conditions would result in a much more severe surplus situation than is projected under our present delivery system. This table assumes that the number of physicians in this specialty will continue to increase at the same rate and will remain in Pennsylvania to the same degree as was true in the 1960s.

Some Conclusions

Obviously, the use of the HMO and paramedical concepts could make our need for basic physicians less acute, or even nonexistant, due to the efficiencies of scale and increased physician productivity potential that they make possible. This report's final projections of need would be too large and the projections of surplus too small if such a drastic change in the medical delivery system occurred in the near future. However, it is not considered likely that so drastic a change will occur so quickly as to render suspect the projections of need made later in this report.

Table 45

A Comparison Between the Conventional Optimum Care Estimates and Prepaid Group Optimum Care Estimates Relative to the Need for General Practice and Internal Medicine Practitioners (Basic Care)[2]

Year	Prepaid Optimum[a]	Medical Economics Optimum[b]	Prepaid Need/ Surplus[c]	Medical Economics Need/Surplus[d]
1971	4,853	8,292	527	-2,912
1972	4,875	8,330	478	-2,977
1973	4,896	8,366	457	-3,013
1974	4,916	8,400	445	-3,039
1975	4,934	8,431	446	-3,051
1976	4,949	9,456	471	-3,059
1977	4,962	8,479	511	-3,006
1978	4,973	8,497	565	-2,959
1979	4,981	8,511	636	-2,894
1980	4,986	8,519	716	-2,817

[a] Uses the combined general practice and internal medicine ratio (2,441:1) of Table 44 x the population projections of Senier and Mulvihill (1972)[5].

[b] Total of the general practice and internal medicine optimum values of Table 39.

[c] Difference between the total of the two values projected in Table 35 for general practice and internal medicine and the value in column 1 of this table.

[d] Values are from Table 41, i.e., the projected total of the general practice and internal medicine values. A positive value in these columns represents a surplus physician situation and a negative value represents probable unmet need.

Table 46

A Comparison Between the Conventional Optimum Care Estimates and Prepaid Group Optimum Care Estimates Relative to the Need for Pediatricians

Year	Prepaid Optimum[a]	Medical Economics Optimum[b]	Prepaid Need/ Surplus[c]	Medical Economics Need/Surplus[d]
1971	1,959	1,185	-1,328	-554
1972	1,968	1,190	-1,305	-527
1973	1,976	1,195	-1,278	-497
1974	1,984	1,200	-1,247	-463
1975	1,991	1,204	-1,213	-426
1976	1,998	1,208	-1,174	-384
1977	2,003	1,211	-1,132	-340
1978	2,007	1,214	-1,086	-293
1979	2,010	1,216	-1,037	-243
1980	2,012	1,217	- 987	-192

[a] Based on the pediatrics ratio (6,048:1) of Table 44 times the population projections of Senier and Mulvihill (1972)[5].

[b] From Table 39.

[c] Difference between the value projected in Table 35 and the value in column 1 of this table.

[d] From Table 41. A positive value in these columns represents a surplus physician situation and a negative value represents probable unmet need. The values in these two columns suggest that a greater demand for pediatricians would develop in a prepaid medical delivery system since many children are now cared for by a general practitioner and parents do not take them to a physician as often as they might like for financial reasons.

Table 47

A Comparison Between the Conventional Optimum Care Estimates and Prepaid Group Optimum Care Estimates Relative to the Need for General Surgeons

Year	Prepaid Optimum[a]	Medical Economics Optimum[b]	Prepaid Need/ Surplus[c]	Medical Economics Need/Surplus[d]
1971	688	1,185	458	- 39
1972	691	1,190	494	- 5
1973	694	1,195	536	35
1974	697	1,200	582	79
1975	699	1,204	630	125
1976	701	1,208	680	173
1977	703	1,211	739	231
1978	705	1,214	801	292
1979	706	1,216	868	358
1980	707	1,217	928	418

[a] Based on the general surgery ratio (17,227:1) of Table 44 times the population projections of Senier and Mulvihill (1972)[5].

[b] From Table 39.

[c] Difference between the value projected in Table 35 and the value in column one of this table.

[d] From Table 41. A positive value in this column represents a surplus physician situation and a negative value represents probable unmet need.

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CHAPTER X

DEMAND DUE TO DEATH, DISABILITY, RETIREMENT AND OUT-MIGRATION

The problem of estimating the need for physicians would be relatively straightforward if it involved only the number of physicians needed to meet anticipated growth or unmet need demand. This is not the whole story, however. Physicians do die, retire, become disabled or go elsewhere to practice (out-migration) and must be replaced.

Determination of a Mortality Rate Base

There is a limited amount of literature on physician mortality and much of it deals with special causes of death, i.e., suicide, radiation, drugs, etc.[1,2,3,4,5]

Several sources do, however, deal with the general issue of physician and/or professional mortality[6,7,8,9,10,11]. The most useful of these sources was judged to be the 1950 mortality estimates of HEW[11] based upon a sampling of death certificates. This material is seen as particularly useful in that it also gives mortality figures for many of the other professions for which projections are to be made by the author at a later date. A common data base for professional mortality rates was considered desirable, if only for comparative purposes.

Table 48 gives physician mortality per 1,000 physicians by age grouping using the HEW data. It then computes HEW mortality rates (percentage) for each age grouping. For comparative purposes Table 48 also gives HEW mortality statistics for all occupations combined.[11] Similar data from the Monthly Labor Review[12] is also given. As noted in Table 48, where the mortality rate for a physician age group was not given (age group 65-69), an arbitrary estimate was made based upon certain regularities between the physician mortality figures and the Monthly Labor Review[12] figures. The figures in Table 48 concerning physician mortality in percentage terms were the basis for later estimates of Pennsylvania physician mortality made in this chapter.

Pennsylvania Physicians Age Distribution

Before the mortality rates of Table 48 could be utilized, however, it was necessary to determine the age distribution of Pennsylvania physicians. Table 49 gives total frequency and female medical physician frequencies by age group for all medical physicians in Pennsylvania, as of November 26, 1971. Total medical physician and specialty area counts are provided for all age groupings from age 20-24 to 100-104.

It was hypothesized that the general age distribution of osteopaths would be essentially identical to that of the medical physicians, and to test this hypothesis Table 50 was constructed.

In Table 50 we find that the discrepancies between the medical physician and doctors of osteopathy age distributions were indeed relatively small (plus or minus 1.7 per cent on the average) and did not exceed 4.7 per cent at the most (age 45-54). It was, therefore, concluded that Pennsylvania-based physician mortality statistics could have been based upon medical physician age distribution (percentage) data alone without serious error resulting. For this study, however, doctors of osteopathy age distribution counts were made and utilized.

Method of Estimating Pennsylvania-Based Mortality Rates

Table 51 delineates the method used to develop estimates of physician deaths in a subcategory for any given year and then derive an overall mortality rate for that category of physician, i.e., .0125 or 1.25 per cent of all 1971 active physicians will die during the following year.

On the assumption that the mortality rate, so derived, would not change markedly from 1971 to 1980, mortality figures were similarly computed for the various specialty groupings of interest (Table 52).

These mortality rates are only for those physicians who are in active practice and under 70 years of age. As noted in Chapter XI, all physicians over 70 are, for the purpose of this study, considered as retired and not subject to replacement because of mortality.

As might be expected, due to differences in average age, the mortality rates for the specialty areas of Table 52 vary considerably from one another.

Table 48

A Comparison of Various Mortality Rate Figures Converted to Death Per 1,000 Base and a Percentage Rate of Mortality

Age Group	Physician Mortality (HEW)[a]	All Occupation Mortality (HEW)[a]	All Occupation Mortality (Labor)[b]	HEW Physician Mortality Rate	All HEW Occupation Mortality Rate	Labor Review All Occupation Mortality Rate
20-24	1.3	1.9	2.2	0.0013	0.0019	0.0022
25-29	1.2	1.9	2.0	0.0012	0.0019	0.0020
30-34	1.4	2.4	2.3	0.0014	0.0024	0.0023
35-44	3.3	4.4	4.0	0.0033	0.0044	0.0040
45-54	10.1	10.9	10.0	0.0101	0.0109	0.0100
55-59	18.2	20.4	19.7	0.0182	0.0204	0.0197
60-64	32.8	29.8	32.5	0.0328	0.0298	0.0325
65-69	(66.0)[c]	-	60.0	(0.0660)[c]	-	0.0600

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[a] Data abstracted from a table of "Mortality by Occupation and Industry Among Men 20 to 64 Years of Age: United States, 1950," Vital Statistics--Special Reports, Vol. 53, No. 2, Health, Education and Welfare, Washington, D.C.

[b] Data abstracted from a table of "Working Life for Males, 1968" (Table 2) in Monthly Labor Review, June 1971, Howard N. Fullerton (Author). The two "all occupations" data sets in these tables do not significantly differ from one another overall.

[c] This is an estimate based upon the fact that the Labor Review rates **are** very similar to the HEW physician mortality rate for the older physicians but higher by one per cent or more, e.g., 60.0 + 1% of 60.0 = 66.0.

Table 49

Age Distributions for Selected Groupings and All M.D.'s as of 1971 Including a Separate Female Physician Count[a]

Age	GP/FP[b]	IM[c]	GS[d]	PD[e]	Other Specialties	All M.D.'s
20-24	3	14(2)	4	1	31(12)	53(14)
25-29	74(8)[f]	503(43)	256(11)	166(54)	1,289(205)	2,288(321)
30-34	160(17)	263(31)	259(10)	180(63)	1,655(200)	2,517(321)
35-39	271(23)	260(15)	172	144(39)	1,424(119)	2,271(196)
40-44	372(24)	254(13)	165(5)	120(35)	1,310(106)	2,221(183)
45-49	457(18)	245(17)	184(6)	106(22)	1,235(122)	2,227(185)
50-54	433(26)	174(11)	158(2)	104(20)	965(95)	1,834(154)
55-59	456(30)	206(9)	167	69(16)	781(59)	1,679(114)
60-64	503(21)	138(4)	120	54(8)	752(47)	1,567(80)
65-69	375(14)	117	75	27(4)	532(34)	1,126(52)
70-74	215(19)	61(6)	41	24(3)	327(37)	668(65)
75-79	143(11)	20(1)	23	9(1)	199(21)	394(34)
80-84	66(3)	21	13	5(2)	115(13)	220(18)
85-89	33(2)	5	6	3(1)	61(5)	108(8)
90-94	17		2		24(8)	43(8)
95-99	1				7(1)	8(1)
100-104		1			3(2)	4(2)
Total	3,579(216)	2,282(152)	1,645(34)	1,012(268)	10,710(1,086)	19,228(1,756)

[a] Derived from analysis by specialty and sex of the AMA tapes as of November 26, 1971.

[b] General practice and family practice combined.

[c] Internal medicine.

[d] General surgery.

[e] Pediatrics, pediatric cardiology, pediatric surgery, pediatric allergy and pediatric radiology combined.

[f] The number of female physicians included in the cell total is given in parentheses.

Table 50

A Comparison of the Age Distributions for Pennsylvania's Doctors of Medicine (Male) and Osteopathy[a]

Age Group	Male M.D.'s	All D.O.'s	Per Cent M.D.'s	Per Cent D.O.'s	Per Cent Difference
20-24	39	---	0.2	0.0	0.2
25-29	1,967	185	11.3	11.7	- 0.4
30-34	2,196	190	12.6	12.0	0.6
35-44	4,113	412	23.5	25.9	- 2.4
45-54	3,722	414	21.3	26.0	- 4.7
55-59	1,565	148	9.0	9.3	- 0.3
60-64	1,487	86	8.5	5.4	3.1
65-69	1,074	69	6.1	4.3	1.8
70+	1,309	86	7.5	5.4	2.1
Total	17,472	1,590	100.0	100.0	0.0
					15.6% (Absolute Value)
Median Age[b]	(45.62)	(44.65)			± 1.7% (Average Per Cent Difference)

[a] Data derived from Directory of the American Osteopathic Association (1970) and a compilation of the AMA data tape (November 26, 1971) provided by the Pennsylvania Medical Society.

[b] Values may differ slightly from those shown elsewhere in this report since they are computed here directly from the table.

Table 51

A Method for Estimating Mortality Derived From the Age Distribution of Physicians in Pennsylvania as of November 26, 1971

Age Grouping	Sample Frequency[a]	Percentage	Estimated Active Physicians in 1971[b]	Mortality Rate[c]	Estimated Deaths
20-24	39	0.22	33	.0013	0.04
25-29	2,152	12.18	1,842	.0012	2.21
30-34	2,386	13.51	2,043	.0014	2.86
35-44	4,525	25.61	3,874	.0033	12.78
45-54	4,136	23.41	3,541	.0101	35.76
55-59	1,713	9.70	1,467	.0182	26.70
60-64	1,573	8.90	1,346	.0328	44.14
65-69	1,143	6.47	979	(.0660)[d]	64.61
Totals	17,667	100.00	15,125	(.0125)[e]	189.10

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[a] The frequencies here represent some of the 17,472 M.D.'s whose birthdates were given in the AMA November 26, 1971 tapes and 1,590 of the doctors of osteopathy listed in the _1970 Directory of Osteopathic Physicians_ for whom birthdates were given.

[b] From Table 35, active physician projections.

[c] "Mortality by Occupation and Industry Among Men 20 to 64 Years of Age: United States, 1950," _Vital Statistics--Special Reports_, Vol. 53, No. 2, September 1962, U.S. Department of Health, Education and Welfare. See Table 50.

[d] See Note c in Table 50.

[e] 189 deaths ÷ 15,125 gives overall rate of .0125.

Table 52

Estimation of Overall Mortality Rate by Specialty and for All M.D.'s Based Upon Working Life of 20-69 Years[a]

Year	Age Group Physician Mortality[b]	GP/FP Count	GP/FP Deaths	IM Count	IM Deaths	GS Count	GS Deaths	PD Count	PD Deaths	Other Spe- cialties Count	Other Spe- cialties Deaths	All M.D.'s Count	All M.D.'s Deaths
20-24	.0013	3	-	14	-	4	-	1	-	31	-	53	-
25-29	.0012	74	-	503	1	256	1	166	-	1,289	1	2,288	3
30-34	.0014	160	-	263	1	259	1	180	-	1,655	2	2,517	4
35-44	.0033	643	2	514	2	337	1	264	1	2,734	9	4,492	15
45-54	.0101	890	9	419	4	342	3	210	2	2,200	22	4,061	40
55-59	.0182	456	8	206	4	167	3	69	1	781	14	1,679	30
60-64	.0328	503	16	138	4	120	4	54	2	752	25	1,567	51
65-69	(.0660)	375	25	117	8	75	5	27	2	532	35	1,126	75
Totals	(.0660)	3,104	60	2,174	24	1,560	18	971	8	9,974	108	17,783	218
Mortality Rate			.0193		.0110		.0115		.0082		.0108		.0123[d]
Corrected Rate[c]			.0196		.0112		.0117		.0083		.0110		.0125
Percentage of M.D.'s[c]		86.73		95.27		94.83		95.95		93.13		92.48	

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[a] Physician counts taken from Table 49.

[b] Mortality rates taken from Table 50.

[c] Corrected by increasing the rate by 1.6 per cent based on note d below in order to approximate the impact of adding a doctor of osteopathy count if it were available.

[d] Slightly different in value from the rate of Table 50 which included doctors of osteopathy. This table assumes that any difference between the rates found here and those that would have been found if doctors of osteopathy had been included will be similarly small, i.e., less than 2 per cent difference from the M.D. plus D.O. value (1.6 per cent).

[e] Represents proportion of the 19,228 M.D.'s of this area of specialization listed in the November 26, 1971 AMA tape.

General practitioners, for example, have the highest rate of mortality because of their declining ranks. Here new physicians are not entering in sufficient numbers to replace those who die or retire. Pediatricians, in contrast, have the lowest mortality rate. This seems to be due to the relatively recent growth of that profession. Only 4 per cent of these medical physicians are 70 years of age or older. In contrast 13 per cent of general practitioners are age 70 or older.

Estimates of Death Replacement Demand

Based upon the Pennsylvania age-based mortality rates of Tables 51 and 52, projections of annual replacement needs due to the death of physicians under 70 years of age were computed. They are to be found in Table 53. As may be seen, 2,154 active practice physicians are projected as dying between the years 1971 and 1980 with 1,890 of these characterized as direct care physicians. Furthermore, as might be expected, the specialty with the greatest proportion of these deaths, is general practice, (759 deaths). The smallest number of deaths is that for pediatricians (68 deaths).

Annual deaths as projected for each category of physician is given. These figures will be used in the final determination of total demand for physicians in each year of the decade.

The Problem of Physician Disability

No specific disability rates for physicians were found in the literature. Fortunately, the United States census findings for Pennsylvania did give disability and related data for the professional, technical and kindred workers of Pennsylvania.[13]

The census findings are found in Table 54 and consist of information concerning disability totals for each age grouping by sex along with total employment figures by sex for each age grouping. The above findings were used to compute total employed per disabled worker ratios. These ratios were then used to approximate total physician disability based on physician (M.D.) age-group distribution data.

Table 55 uses the male professional disability ratios of Table 54 to get 1971 estimates of total disability for general practice, internal medicine, pediatrics, general surgery and other specialties, and for individual and active physicians in general. Specialty and active physician total employed per disabled physician rates were then derived and placed in Table 55, e.g., 13 active general practitioners per disabled general practitioner. The active to disabled physician ratios of Table 55 were then applied to projections of the number of physicians of each category found in Table 35. This resulted in year by year projections of the number of disabled physicians in each category (see Table 56).

Replacement Due to Disability

The total number of disabled physicians for Pennsylvania in a given year (Table 56) does not, however, tell us how many of these physicians became disabled during that year and would, therefore, have to be replaced. This disability per year figure could, however, be considered as at least roughly equivalent to the number of disabled physicians this year minus the number for the preceding year, i.e., the change in number from year to year. We will have to assume, however, that the number of physicians who return to practice from the disabled category is small enough to be insignificant in its effect.

Table 57 attempts to summarize the differences between the disabled totals of Table 56 and introduces corrections for the purpose of getting smooth trend figures. In the case of general/family practice, the actual differences were negative values because of the shrinking of this profession and, therefore, could not accurately reflect the number becoming disabled each year. An arbitrary decision to make the newly disabled per year figure twice that for internal medicine was made based upon prior observed relationships between mortality, etc., of internists and general practitioners.

In general then, approximately 347 physicians will become disabled during the years from 1971 to 1980. Around 33 per year on the average will be disabled. To be more specific, 6 general practice, 3 internists, 2 to 3 pediatricians, 3 general surgeons and 17 physicians in other direct care specialties will become disabled each year if these figures are reasonably correct.

The Problem of Physician Retirement

Physicians, being largely self-employed, do not normally retire at age 65 as do most working males.[14] Instead, they often just continue working until, in some instances, they are in their 90s.[14] However, at least one study indicates that the working lifespan of physicians typically ends around age 71 or 72.[15]

Conversations with physicians and the Pennsylvania Medical Society combined with the data gathered for this study have led to a conclusion that retirement at an earlier age for physicians is fast

Table 53

Projections of Physician Replacement Due to Death

Year	Projected General/ Family Practice[a]	GP/FP Deaths[b]	Projected Internal Medicine[a]	IM Deaths[b]	Projected Pedia-tricians[a]	PD Deaths[b]	Projected General Surgeons[a]	GS Deaths[b]	Projected Other Specialties[a]	Other Specialty Deaths[b]	Direct Care Physicians[a]	Direct Care Physicians Deaths[b]	Active Practice Physicians[a]	Active Practice Deaths[c]
1971	3,987	78	1,393	16	631	5	1,146	13	6,238	69	13,392	167	15,125[d]	189
1972	3,929	77	1,424	16	663	6	1,185	14	6,502	72	13,693	171	15,490	194
1973	3,894	76	1,459	16	698	6	1,230	14	6,762	74	14,023	175	15,891	199
1974	3,865	76	1,496	17	737	6	1,279	15	7,042	77	14,297	179	16,337	204
1975	3,840	75	1,540	17	778	6	1,329	16	7,329	81	14,779	185	16,801	210
1976	3,832	75	1,588	18	824	7	1,381	16	7,642	84	15,217	190	17,327	217
1977	3,833	75	1,640	18	871	7	1,442	17	7,963	88	15,683	196	17,881	224
1978	3,844	75	1,694	19	921	8	1,506	18	8,306	91	16,192	202	18,490	231
1979	3,867	76	1,750	20	973	8	1,574	18	8,659	95	16,726	209	19,129	239
1980	3,893	76	1,809	20	1,025	9	1,635	19	9,013	99	17,264	216	19,772	247
Total Deaths		759		177		68		153		830		1,890		2,154

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[a] See Table 35 for projections. All projections for direct care physicians with the exception of the active practice physicians (M.D. and D.O.).

[b] See Table 52 for mortality rates (corrected).

[c] Based on the same rate for direct care physicians. Assumes the non-direct care physician age distribution to be essentially the same as the direct care distribution.

[d] Does not include interns or residents in the active total.

Table 54

Estimation of Professional, Technical and Kindred Worker Disability Ratios Based on 1970 Census Findings[a]

I. Disability Totals by Age

Sex	Age 25-34	35-44	45-54	55-64	Total
Male	3,320	3,316	4,934	3,884	15,454
Female	1,174	1,365	2,201	2,150	6,890

II. Total Employed By Age

Sex	Age 25-34	35-44	45-54	55-64	Total
Male	112,264	90,845	72,921	43,508	319,538
Female	57,409	45,023	43,002	35,758	181,192

III. Total Employed Per Disabled Worker[b]

Sex	Age 25-34	35-44	45-54	55-64	Total
Male	34	27	15	11	21
Female	49	33	20	17	26

[a] All data derived from Table 169 of the "Detailed Characteristics--Pennsylvania," Report PC(1)--D40, of the Bureau of the Census, U.S. Department of Commerce, November 1972.

[b] Result of dividing the disability total into the employed total to obtain the ratio of employed to disabled, e.g., 112,264 ÷ 3,320 = 34 (rounded off), i.e., 34 employed to each disabled professional, technical or kindred worker.

Table 55

Computation of Physician Disability Ratios Based on 1971 Active M.D. Age Distribution

Age	Professional Technical Disability Ratio[a]	GP/FP Count[b]	GP/FP Disabled[c]	IM Count[b]	IM Disabled[c]	PD Count[b]	PD Disabled[c]	GS Count[b]	GS Disabled[c]	Other Specialty Count[b]	Other Specialty Disabled[c]	All Active Physicians Count[d]	Active Physicians Disabled[c]
25-34	34:1	234	7	766	23	346	10	515	15	2,944	87	4,538	133
35-44	27:1	643	24	514	19	264	10	337	13	2,734	101	4,525	168
45-54	15:1	890	59	419	28	210	14	342	23	2,200	147	4,136	276
55-64	11:1	959	87	344	31	123	11	287	26	1,533	139	3,286	299
65-69	7:1[e]	375	54	117	17	27	4	75	11	532	76	1,143	163
Total		3,104	231	2,174	118	971	49	1,560	88	9,974	550	17,667	1,039
Physician Disability Ratio[f]		13:1		18:1		20:1		18:1		18:1		17:1	

[a] See male total employed to disabled ratios of Table 54.

[b] Data derived from Table 52 (active M.D.'s including residents and interns).

[c] Previous column value divided by the number employed per disabled professional figure of column one, e.g., 234 ÷ 34 = 7.

[d] See Table 51 (includes D.O.'s).

[e] An arbitrary estimate. May even be conservative since disability due to stroke, etc. rises sharply in later years of life.

[f] Total 1971 physician count in question divided by the number disabled, e.g., 3,104 ÷ 231 = 13 or 13 employed to 1 disabled physician.

Table 56

Projections of Total Physician Disability By Year As A Base For Estimating Replacement Due to Disability

Year	Projected General/ Family Practice[a]	GP/FP Disabled[b]	Projected Internal Medicine[a]	IM Disabled[b]	Projected Pedia-tricians[a]	PD Disabled[b]	Projected General Surgeons[a]	GS Disabled[b]	Projected Other Specialties[a]	Other Specialty Disabled[b]	Direct Care Physicians[a]	Direct Care Disabled[d]	Projected Other Activity[c]	Other Activity Disabled[e]
1971	3,987	307	1,393	77	631	32	1,146	64	6,238	347	13,392	788	1,733	96
1972	3,929	302	1,424	79	663	33	1,185	66	6,502	361	13,693	805	1,797	100
1973	3,894	300	1,459	81	698	35	1,230	68	6,762	376	14,023	825	1,868	104
1974	3,865	297	1,496	83	737	37	1,279	71	7,042	391	14,297	841	2,040	113
1975	3,840	295	1,540	86	778	39	1,329	74	7,329	407	14,779	869	2,022	112
1976	3,832	295	1,588	88	824	41	1,381	77	7,642	425	15,217	895	2,110	117
1977	3,833	295	1,640	91	871	44	1,442	80	7,963	442	15,683	923	2,198	122
1978	3,844	296	1,694	94	921	46	1,506	84	8,306	461	16,192	952	2,298	128
1979	3,867	297	1,750	97	973	49	1,574	87	8,659	481	16,726	984	2,403	134
1980	3,893	299	1,809	101	1,025	51	1,635	91	9,013	501	17,264	1,016	2,508	139

[a] See Table 35 for projections. All projections are for direct care M.D. and D.O. physicians with the exception of the other activity physicians.

[b] See Table 55 for the disability ratio used here, e.g., for GP/FP disability 3,987 + 13 = 307. These figures must be treated with caution. The number of GP's is falling during the early period and also the average age of the group is high and rising during this period.

[c] Results of subtracting direct care projections of Table 35 from the active physician projections..

[d] Uses the same disability ratio as for all active physicians in Table 55, i.e., 17:1.

[e] Uses the ratio of 18:1 on the assumption that those active in research, administration teaching, etc., are more like the other specialists of Table 55 than like GP's or physicians taken as a whole.

Table 57

Projections of Replacement Due to Disability[a]

Year	General Family Practice[b]	Internal Medicine	Pediatrics	General Surgery	Other Specialties	All Direct Care Physicians[c]	Physicians In Other Activities	All Active Physicians[d]
1971[e]	4 (6)	2	1	2	14	23 (25)	4	27 (29)
1972	4 (6)	2	1	2	14	23 (25)	4	27 (29)
1973	6 (6)[f]	3	2	2	15	28 (28)	4	32 (32)
1974	4 (6)	2 (3)	2	3	15	26 (29)	9 (5)	35 (34)
1975	6 (6)	3	2	3	16	30 (30)	0 (5)	30 (35)
1976	4 (6)	2 (3)	3	3	18 (17)	30 (32)	5	35 (37)
1977	6 (6)	3	3	3	17 (18)	32 (32)	5	37 (38)
1978	6 (6)	3	2 (3)	4	19	34 (35)	6	40 (41)
1979	6 (6)	3	3	3 (4)	20	35 (36)	6	41 (42)
1980	8 (6)	4	2 (3)	4	20	38 (37)	5 (6)	43 (43)
Total	54(60)	2 (29)	21(23)	29(30)	168(168)	299(310)	48(50)	347(360)

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[a] Based upon Table 56, i.e., change in the number of disabled.

[b] Since the total are generally falling for these physicians, an erroneous disability figure is assumed to result since actually the median age is rising and the death rate is much higher. An arbitrary assumption of disability replacement at least twice that for internal medicine has, therefore, been made.

[c] A simple total of all preceding columns.

[d] The total of the last two columns.

[e] Since no 1970 disability totals are available in Table 56, the values for 1971 are simply assumed to be equal to the 1972 minus 1971 disable figure.

[f] The figures in parentheses are attempts to smooth the disabled growth figure and in the case of general and family practice, it is assumed to be constant at twice the average of the values in parentheses for internal medicine.

developing for a variety of reasons. First, the physician's income and general socioeconomic status now make it possible for him deliberately to plan for an early retirement through judicious investment and retirement insurance plans. Second, the increasingly leisure-oriented society of today might affect his decision to retire as it makes retirement less of a stigma than before. Third, the paperwork and high overhead of medical practice today makes part-time practice less practicable and desirable than in the past. Finally, the specialties may become sufficiently characterized by surplus or close to optimum physician ratios as to make the physician feel free to retire without feeling guilty about his services being badly needed.

For these reasons, the retirement estimates of this study have been set at a somewhat lower age of 70 and it is assumed, for the purpose of simplification, that all physicians, to all intents and purposes, retire at age 70. Of course, some continue to practice at a reduced level, but it is assumed that such physicians will be counterbalanced by those physicians retiring before the age of 70.

Older Physician Age Distribution

In order to get a picture of the number of persons who are likely to be retired after age 70 during the next decade, it was necessary first to get an age distribution of physicians as of 1971, who were between the ages of 61 and 71 for each category of physician that was of interest. This data, from an analysis of the AMA tapes of November 26, 1971, is found in Table 58.

We then need to have the age 71 estimates of Table 58 modified to reflect what the age 70 total would have been the year before, i.e., in 1970, so that we could correct the retirement figures for attrition due to death between 1970 and 1971To do this, Table 59 first lists the 1971 totals for age 71 for each category of physician. These *1971 incidence* figures are then corrected to give the number of physicians aged 70 years in 1970 by using the .0667 mortality rate for ages 65-69 (Tables 48 and 51). This was done by multiplying 1971's age 71 figures for each category in Table 59 by 6.7 per cent in order to get an approximation of the number of medical physicians aged 70 in 1970.

Computation of Retirement Rates

The resulting 1970 (age 70) estimates were then divided by the total number of active physicians in that category in 1970 in order to ascertain the proportion of active physicians who would retire during 1970 although, admittedly, some of these would also die between 1970 and 1971. For all practical purposes, however, they must be replaced as though all had retired and not died during the year. The resulting proportions were then listed in Table 59 and labeled as estimates of the active physician retirement rate for each category of physician.

Projections of Retirement 1971-1980

The active physician retirement rate of Table 59 was then applied to the growth projections of Table 35 in order to obtain the data of Table 60 which projects replacement demand due to retirement for the period 1971-80.

As indicated in Table 60, note a, the category *other activity* was derived by subtracting direct care totals from active physician totals in Table 35 and then multiplying the differences by 1.2 per cent, the other specialist retirement rate found in Table 59. It was assumed here that physicians not in direct patient care would be most like those in the more specialized areas of medicine.

The results of Table 60 indicate that we will have to produce or import approximately 2,236 physicians to meet the retirement-based demand for physicians from 1971-1980; 733 of these physicians will be family practice oriented (general practice) physicians. Their retirement rate is, as might be expected, substantially higher than that for other specialties. Pediatrics and general surgery have the lowest rate of retirement due to their rapid growth or recent growth.

The Problem of Out-Migration

As with in-migration, the out-migration of physicians from the state could not be obtained by simply analyzing data on the present status of Pennsylvania's physicians as of November 26, 1971 (AMA tape). Instead, it was necessary to turn to two recent physician directories, published yearly by the AMA, and using a 10 per cent sample of the 1967 directory listings, to determine the whereabouts of these physicians in 1969, using a 1969 directory. Presumably, those physicians no longer listed in Pennsylvania but found to be listed in another state or overseas, or as in the Armed Services or Federal Goverment Services, represent out-migration. These figures are obtained when the sample figure is multiplied by 10 in order to approximate the number out-migrating from the total

Table 58

1971 M.D. Age Distribution for Retirement Estimates[a]

Age	Retirement Year	GP/FP[b]	IM[c]	GS[d]	PD[e]	Other Specialties	All Physicians
71	1970	59	20	7	5	78	169
70	1971	40	19	11	9	68	144
69	1972	67	13	16	4	86	186
68	1973	56	22	12	5	92	187
67	1974	61	17	18	6	108	210
66	1975	83	31	12	2	120	248
65	1976	108	34	17	10	126	295
64	1977	99	24	21	10	131	285
63	1978	110	33	21	11	153	328
62	1979	95	37	28	5	161	326
61	1980	95	21	28	12	140	296
Totals		873	271	191	79	1,263	2,677

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[a] Derived from AMA tapes dated as of November 26, 1971.

[b] General practice and family practice combined.

[c] Internal medicine.

[d] General surgery

[e] Pediatrics and associated pediatric specialties.

Table 59

Estimates of Active M. D. Retirement Rates Based on 1970 Classification of Physicians Data and the Number of Physicians of Age 71 (1971) Corrected for Mortality to 1970 Equivalents

	1971 Incidence[a]	Corrected to 1970[b]	Total Active 1970[c]	Active Physician Retirement Rate
General Practice	59	63	3,327	.0189
Internal Medicine	20	21	1,582	.0133
General Surgery	7	8	796	.0063
Pediatrics	5	5	1,104	.0063
Other Specialties	78	83	6,919	.0120
All M.D.'s	169	180	13,728	.0131

[a] See Table 58.

[b] Each figure in the first column was increased by 6.7 per cent, the estimated probable loss due to mortality from 1970-71.

[c] Do not include interns and residents. Based on data taken from Classification of Physicians in the United States, 1970, a publication of the American Medical Association.

Table 60

Projections of Replacement Due to Retirement[a]

Year	General/ Family Practice	Internal Medicine	Pediatrics	General Surgery	Other Specialties	Direct Care Physicians[b]	Other Activity	All Active Physicians[c]
1971	75	19	4	7	75	180	21	201
1972	74	19	4	7	78	182	22	204
1973	74	19	4	8	81	186	22	208
1974	73	20	5	8	85	191	24	215
1975	73	20	5	8	88	194	24	218
1976	72	21	5	9	92	199	25	224
1977	72	22	5	9	96	204	26	230
1978	73	23	6	9	100	211	28	239
1979	73	23	6	10	104	216	29	245
1980	74	24	6	10	108	222	30	252
Total	733	210	50	85	907	1,985	251	2,236
Rate[d]	.0189	.0133	.0063	.0063	.0120		.0120[d]	

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[a] Arbitrarily assumes no retirement before 70 years of age and that all physicians are, for all practical purposes, retired after 70 years of age. Based on the projections of Table 35 with other activity, the difference between the active and direct care projections above times 0.0120, the retirement rate of Table 59 (see note e below).

[b] Sum of previous columns.

[c] Sum of first two columns.

[d] See Table 59.

[e] Assumes the rate for other specialties to be applicable here, since these physicians are usually highly trained specialists other than basic care physicians.

1967 population of Pennsylvania physicians during the two year period of 1967 to 1969.

Table 61 corrects these findings by dividing by 2 in order to approximate the out-migration that occurred in one year (roughly 1968). Interns are not listed, but physicians-in-residenceare found in Table 61. Table 61 deals, however, primarily with the out-migration of active physicians who are in practice beyond the residency level.

We see in Table 61, for example, that approximately 25 Pennsylvania – trained general practitioners are estimated to have left the state in 1968. Of these 25, 15 went to another state, 5 went overseas temporarily and 5 entered government service of some kind. Ten general practitioners who were trained in a state other than Pennsylvania but who were practicing full time in Pennsylvania are estimated to have left the state in 1968 to practice in some other state. Of the five foreign-trained general practice physicians who left in 1968, all went to practice in another state. Altogether, Pennsylvania is estimated to have lost 40 general practice physicians in 1968, 30 to another state, 5 to temporary foreign residence and 5 to government service. It is interesting to note that the foreign-trained physicians who returned to their native soil tended to be highly specialized in their training, e.g., 95 returned and only 10 went to another state (see Section V of Table 61).

When all active medical physicians are considered, Table 61 indicates that Pennsylvania lost about 415 active physicians in 1968 (beyond the residency and in actual practice) with 130 of these Pennsylvania trained, 145 trained in another state and 140 trained in a foreign medical school. It should be noted that the number returning to foreign soil are actually figures based upon inference, since these figures represent foreign-trained physicians who were no longer listed by the AMA in 1969 and are presumed to have left the country.

Net Migration

Although the out-migration estimates will be used separately from the in-migration estimates in the determination of physician need in Chapter XI, it is of interest to look at actual net migration estimates based on the data in Tables 15 (In-migration) and 61 (Out-migration).

The resulting migration figures are to be found in Table 62. They indicate that, on the whole, Pennsylvania attracts more practicing physicians than it loses. There are exceptions, however. Pediatrics, for example, indicates a net gain for Pennsylvania-trained pediatricians but an equal net loss for those pediatricians who are trained elsewhere. The net figure for physicians in residency is also zero, probably due to the hospitals pretty well filling the positions as they open. The only categories where the net migration is negative or zero in value were for Pennsylvania-trained general practice medical physicians (a zero value) and for active Pennsylvania-trained medical physicians who are not in direct patient care (Section VII of Table 62).

Apparently, we lose about as many Pennsylvania-trained general practitioners as we gain from those returning from the Armed Forces. In the case of physicians who are not in direct patient care, e.g., research, teaching, administration, etc., we are losing more than we attract, half going to another state and half taking up temporary foreign residence.

Estimation of Migration Ratios

Table 63 used the findings of Table 62 and 1968 physician totals 16, in order to arrive at a ratio of the number of migrants to total physician population for a given category such as internal medicine. The results are tabled in the last column of Table 63 and give out-migration, in-migration and net migration ratios for physicians in each category.

Projections of Physician Migration

Table 64 uses the ratio findings of Table 63 combined with the growth projections of Table 35 to arrive at tabled physician migration figures for each physician category. Out-in- and net-migration estimates are given. Since in-migration was already computed and included in the chapter on physician supply (Chapter VII), the out-migration estimates of Table 64 will be the estimates used to determine total physician demand in the next chapter.

Out-migration

If the projections of Table 64 are correct, we will need at least 4,867 physicians from 1971 to 1980 to meet demand due to out-migration, but will import some 6,283 physicians to more than meet this need, i.e., a net increase in supply due to migration of 1,417. Only pediatrics shows no positive net in-migration and here there is no net loss indicated.

The findings on migration are, of course, based on

Table 61

A Summary of Out-Migration Estimates Derived From Original Counts Based on a 10 Per Cent Sample of All M.D.'s in the 1967 Directory of the American Medical Association[a]

Destination	Place Received Medical Education			Total
	Pennsylvania	Other States	Foreign	
I. General Practice				
Out-State	15(3)[b]	10(2)	5(1)	30(6)
Armed Forces				
Temp. Foreign Residence[d]	5(1)			5(1)
Government Service	5(1)			5(1)
All Destinations	25(5)	10(2)	5(1)	40(8)
II. Internal Medicine				
Out-State	5(1)[b]	25(5)		30(6)
Armed Forces	5(1)			5(1)
Government Service		5(1)		5(1)
All Destinations	10(2)	30(6)		40(8)
III. Pediatrics				
Out-State	10(2)[b]	10(2)	5(1)	25(5)
All Destinations	10(2)	10(2)	5(1)	25(5)
IV. General Surgery				
Out-State			5(1)	5(1)
Temp. Foreign Residence	5(1)[b]			5(1)
All Destinations	5(1)		5(1)	10(2)
V. Other Specialties				
Out-State	45(9)[b]	20(4)	10(2)	75(15)
Armed Forces	15(3)	10(2)		25(5)
Temp. Foreign Residence		5(1)		5(1)
Return to Native Soil			95(19)	95(19)
All Destinations	60(12)	35(7)	105(21)	200(40)
VI. All Active Direct Care M.D.'s Combined				
Out-State	75(15)[b]	65(13)	25(5)	165(33)
Armed Forces	20(4)	10(2)		30(6)
Temp. Foreign Residence	10(2)	5(1)		15(3)
Government Service	5(1)	5(1)		10(2)
Return to Native Soil			95(19)	95(19)
All Destinations	110(22)	85(17)	120(24)	315(63)

Table 61
(continued)

Destination	Place Received Medical Education			Total
	Pennsylvania	Other States	Foreign	
VII. Active M.D.'s Not in Direct Patient Care				
Out-State	10(2)[b]	40(8)	15(3)	65(13)
Temp. Foreign Residence	5(1)	15(3)		20(4)
Government Service	5(1)	5(1)		10(2)
Return to Native Soil			5(1)	5(1)
All Destinations	20(4)	60(12)	20(4)	100(20)
VIII. All Active M.D.'s Combined				
Out-State	85(17)[b]	105(21)	40(8)	230(46)
Armed Forces	20(4)	10(2)		30(6)
Temp. Foreign Residence	15(3)	20(4)		35(7)
Government Service	10(2)	10(2)		20(4)
Return to Native Soil			100(20)	100(20)
All Destinations	130(26)	145(29)	140(28)	415(83)
IX. Residents[c]				
Out-State	45(9)[b]	60(12)	80(16)	185(37)
Armed Forces	70(14)	40(8)	15(3)	125(25)
Temp. Foreign Residence	5(1)	10(2)	5(1)1	20(4)
Government Service	15(3)	10(2)	30(6)	55(11)
Return to Native Soil			120(6)	120(24)
Unknown	10(2)			10(2)
All Destinations	145(29)	120(24)	250(50)	515(103)

X. Not Subsequently Listed but U.S. Trained--Possible Deaths or Clerical Error

Category	Place Received Medical Education		Total
	Pennsylvania	Other States	
Active	65(13)	10(2)	75(15)
Residents	10(2)	10(2)	20(4)

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[a] Derived from a 10 per cent sample of physicians listed in the 1967 Directory of the American Medical Association and their subsequent location in the 1969 Directory.

[b] Data in parentheses indicates sample count. Data outside the parentheses represents estimate of total popualtion out-migration for a single year, 1968, e.g., if 9 in two years and, therefore, 4.5 in one year then 10 times 4.5 will give the estimate for the popualtion.

[c] Residents are summarized but not used to estimate replacement due to out-migration.

[d] Represents those physicians who are abroad temporarily residing.

Table 62

Estimated 1968 Net Migration Based on Tables 15 and 61

I. General Practice

	Place Received Medical Education			
	Pennsylvania	Another State	Foreign	Total
In-Out State	- 5	0	5	0
Armed Forces	15	10	-	25
From-To Temporary Foreign Residence	- 5	-	-	- 5
Government Service	- 5	-	-	- 5
Another Country	-	-	15	15
Combined	0	10	20	30

II. Internal Medicine

In-Out State	5	-20	-	-15
Armed Forces	5	5		10
Government Service	10	- 5		5
Another Country			15	15
Combined	20	-20	15	15

III. Pediatrics

In-Out State	5	-10	- 5	-10
Armed Forces	10	-	-	10
Combined	15	-10	- 5	0

IV. General Surgery

In-Out State	10	10	0	20
Armed Forces	10	5	-	15
From-To Temporary Foreign Residence	- 5	-	-	- 5
Government Service	5	-	-	5
Another Country	-	-	10	10
Combined	20	15	10	45

V. Other Specialties

In-Out State	5	15	15	35
Armed Forces	25	0	-	25
From-To Temporary Foreign Residence	5	- 5	-	0
Government Service	10	10		20
Another Country	-	-	-55	-55
Combined	45	20	-40	25

Table 62 (continued)

	Place Received Medical Education			
	Pennsylvania	Another State	Foreign	Total
VI. All Active Direct Care M.D.'s Combined				
In-Out State	20	- 5	15	30
Armed Forces	65	20	-	85
From-To Temporary Foreign Residence	- 5	- 5	-	-10
Government Service	20	5	-	25
Another Country	-	-	-15	-15
Combined	100	15	0	115
VII. Active M.D.'s Not in Direct Care				
In-Out State	- 5	5	-10	-10
Armed Forces		10	10	20
From-To Foreign Residence	- 5	-10		-15
Government Service	0	10		10
Another Country			10	10
Combined	-10	15	10	15
VIII. All Active M.D.'s Combined				
In-Out State	15	0	5	20
Armed Forces	65	30		95
From-To Foreign Residence	-10	-15		-25
Government Service	20	15		35
Another Country			- 5	- 5
Combined	90	30	0	120
IX. Residents				
In-Out State	10	-40	- 5	-35
Armed Forces	-10	20	-15	- 5
From-To Foreign Residence	0	-10	0	-10
Government Service	- 5	- 5	-30	-40
Another Country			100	100
Unknown	-10			-10
Combined	-15	-35	50	0

Table 63

Estimation of Migration Ratios

I. Out-Migration

	1968 M.D. Totals[a]	1968 M.D. Migration[b]	Ratio
All Active M.D.'s	13,416	415	.0309
Direct Care M.D.'s	11,580	315	.0272
General/Family Practice	3,487	40	.0115
Internal Medicine	1,270	40	.0315
Pediatrics	541	25	.0462
General Surgery	985	10	.0102
Other Specialties	5,297	200	.0378
II. In-Migration			
All Active M.D.'s	13,416	535	.0399
Direct Care M.D.'s	11,580	430	.0371
General/Family Practice	3,487	70	.0201
Internal Medicine	1,270	55	.0431
Pediatrics	541	25	.0462
General Surgery	985	55	.0558
Other Specialties	5,297	225	.0425
III. Net Migration			
All Active M.D.'s	13,416	120	.0090
Direct Care M.D.'s	11,580	115	.0099
General/Family Practice	3,487	30	.0086
Internal Medicine	1,270	15	.0116
Pediatrics	541	0	.0000
General Surgery	985	45	.0456
Other Specialties	5,297	25	.0047

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[a] Figures derived from "Distribution of Physicians in the United States, 1968," published by the Ameri[illegible] Medical Association (inactive, interns and residents excluded).

[b] Derived from Tables 15 and 61.

Table 64

Projections of Physician Migration During the 1970s[a]

Year	All Active Physicians	Direct Care Physicians	General/ Family Practice	Internal Medicine	Pediatrics	General Surgery	Other Specialties
I. Out-Migration							
1971	430	331	37	42	29	11	224
1972	440	339	36	43	31	11	233
1973	451	346	35	44	32	12	243
1974	463	355	34	45	34	12	253
1975	476	364	34	46	36	13	263
1976	490	374	33	48	38	13	274
1977	505	385	33	49	40	14	286
1978	521	396	32	51	42	15	298
1979	537	408	32	52	45	15	310
1980	554	419	31	54	47	16	322
Total	4,867	3,717	337	474	374	132	2,706
II. In-Migration							
1971	555	451	64	58	29	60	252
1972	568	462	63	58	31	63	262
1973	582	472	62	60	32	65	273
1974	598	484	60	62	34	68	284
1975	614	496	59	64	36	70	296
1976	633	510	58	65	38	73	308
1977	652	525	57	67	40	76	321
1978	672	540	56	70	42	80	335
1979	694	556	55	72	45	83	348
1980	715	572	54	74	47	86	362
Total	6,283	5,068	588	650	374	724	3,041
III. Net Migration[b]							
1971	125	120	28	16	0	49	28
1972	128	123	27	16	0	51	29
1973	131	126	26	16	0	53	30
1974	135	129	26	17	0	55	32
1975	139	132	25	17	0	57	33
1976	143	136	25	18	0	60	34
1977	147	140	24	18	0	62	36
1978	152	144	24	19	0	65	37
1979	156	148	24	19	0	68	39
1980	161	153	23	20	0	70	40
Total	1,417	1,351	252	176	0	590	338

[a] Derived from Tables 35 and 63 where the total M.D. projection for a given year is multiplied times the appropriate ratio of Table 63, e.g., in the case of active practice physicians in 1971, 13,846 + 54 times 0.0309 equals 430. Data from the doctors of osteopathy indicated no net migration either way and so the projected total in Table 35 for M.D.'s and D.O.'s combined was not used.

[b] The net figures are a result of using the ratios of Table 63 rather than a subtraction of the values for sections I and II of this table. A small difference between the two methods is therefore possible.

medical doctors only but there is no reason to believe that the doctors of osteopathy would not follow a similar pattern. It is also likely that the osteopaths would not make an appreciable difference in view of their relatively small numbers.

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CHAPTER XI

PENNSYLVANIA'S PROJECTED 1971-80 PHYSICIAN NEEDS

Demand Due to Growth

Table 65 summarizes projections of demand due to growth for the various categories of physician with which this study has been primarily concerned, i.e., all active physicians, physicians in direct patient care, physicians in general practice, internal medicine, pediatrics, general surgery and other specialties in general.

These estimates of growth demand are simply statements of the amount of projected year-to-year change in the growth figures of Table 35 the change estimates for 1971 are based upon the 1971 projections of Table 35 minus actual 1970 figures from the physician distribution series of the American Medical Association or the 1971 directory of the American Osteopathic Association.[2]

It is clear in Table 65 that, as mentioned in Chapter VIII, general practice will end its historic decline and begin to grow around 1977. General surgery is projected as becoming relatively stable in growth from 1977 on, while relatively continuous growth is projected for the other specialties. If correct, the yearly demand due to growth figures will increase over the period 1971-80 by 1978 per cent for active physicians, 156 per cent for physicians in direct patient care, 56 per cent for general and family practice, 118.5 per cent for internal medicine, 550 per cent for pediatrics, 52.5 per cent for general surgery and 92 per cent for other specialties.

The projected growth of the pediatric profession may seem to be excessively high in light of Pennsylvania's declining birth rate, e.g., in 1960 Pennsylvania had 241,099 births,[4] and in 1970,192,154 births.[5] It is further estimated (unpublished) by the Bureau of Educational Statistics, that the figures for 1972 and 1973 will be about 163,838 and 154,000, respectively. Other factors, however, are also playing a role. Parents are, more and more, choosing to take their children to a pediatrician; general practice physicians are becoming increasingly short in numbers relative to the needs; family medicine is too new a specialty to have much impact for some time and, finally, the discrepancy between the presumed optimum care figure for the prepaid group plans and the present population per physician ratio is quite large, suggesting that the standard care ratio arrived at by **Medical Economics**[3] may be too conservative relative to optimum care needs. In light of the latter considerations, the growth estimate of 550 per cent was accepted as likely to be a valid figure.

Projections of Physician Need

Projections of Pennsylvania's 1971 through 1980 physician needs are found in Tables 66-72. The methodology used in developing these tables was simply that of combining all of the previous estimates of supply, growth demand and replacement needs due to death, retirement, disability and out-migration in such a way as to derive several different estimates of need.

Each of the tables shows first the number of physicians projected based on Table 35. The next column then lists the demand due to growth figures of Table 65. Death, retirement, disability and out-migration estimates are then listed in successive columns, by year, from Tables 53, 60, 57 and 64, respectively. The figures of the next column, estimated demand, are a summation of the growth, death, retirement, disability and out-migration estimates from the preceding column, e.g., 231 + 189 + 201 + 29 + 430 = 1,080.

The supply column lists yearly estimates of supply taken from Table 22a and assumes that the medical schools will grow as projected in their responses to the survey conducted by the author (Appendix D).

The unmet need column that follows is actually a statement of minimum physician need and is based upon the subtraction of supply from the demand estimates (two preceding columns). These unmet need projections are limited in that they assume that the growth demand figure reflects all of the demand that exists, i.e., that the supply is unconstricted and is capable of filling any existing demand, a questionable assumption in the case of physicians.

As pointed out in Chapter IX, the actual need for physicians, beyond the number available from the present supply sources, can possibly be approximated by the use of optimum physician ratios based upon a survey conducted by the journal **Medical Economics**.[3] The estimates of optimum care unmet need derived

Table 65

Estimates of Physician Replacement Due to Growth[a]

Year	Active Physicians	Direct Patient Care	General Practice	Internal Medicine	Pediatrics	General Surgery	Other Specialties
1971	231[b]	210	- 46[c]	27	8	40	184
1972	365	301	- 58	31	32	39	264
1973	351	330	- 35	35	35	45	260
1974	496	274	- 29	37	39	49	280
1975	464	482	- 25	44	41	50	287
1976	526	438	- 8	48	46	52	313
1977	554	466	1	52	47	61	321
1978	609	509	11	54	50	64	343
1979	639	534	23	56	52	68	353
1980	643	538	26	59	52	61	354
Total	4,878	4,082	-140	443	402	529	2,959

[a] Based upon the growth projections of Table 35 plus estimates of the number of physicians in 1970 as a base (using the projections of Table 33 for 1970 plus the actual counts in the 1970 edition of the "Distribution of Physicians" published by the AMA with interns and residents excluded).

[b] The 1971 growth replacement was derived by subtracting the 1970 figure from the 1971 figure, i.e., 15,125 (Table 35) minus 13,728 M.D.'s (1970 AMA "Distribution of Physicians") minus 1,166 doctors of osteopathy (direct patient care figure from Table 33). Subsequent replacement due to growth estimates were obtained by a similar subtraction process using the projections of Table 35, e.g., 15,490 - 15,125 = 365 for 1972.

[c] A negative figure represents negative growth, i.e., a net loss in numbers.

Table 66

Projected Active Physician Needs (1971-80)

Year	Projected Physicians[a]	Growth[b]	Deaths[c]	Retire-ment[d]	Dis-ability[e]	Out-migration[f]	Estimated Demand	Supply[g]	Unmet Need	Optimum Care Unmet Need[h]	Total Unmet Need	Possible Foreign Trained Re-placement[g]	Maximum Possible Need
1971	15,125	231	189	201	29	430	1,080	676	404	166	570	157	727
1972	15,490	365	194	204	29	440	1,232	744	488	166	654	171	825
1973	15,841	351	199	208	32	451	1,241	766	475	166	641	174	815
1974	16,337	496	204	215	34	463	1,412	819	593	166	759	187	946
1975	16,801	464	210	218	35	476	1,403	838	565	166	731	192	923
1976	17,327	526	217	224	37	490	1,494	907	587	166	753	206	959
1977	17,881	554	224	230	38	505	1,551	945	606	166	772	212	984
1978	18,490	609	231	239	41	521	1,641	1,000	641	166	807	223	1,030
1979	19,129	639	239	245	42	537	1,702	1,042	660	166	826	229	1,055
1980	19,772	643	247	252	43	554	1,739	1,056	683	170	853	233	1,086
Total	-	4,878	2,154	2,236	360	4,867	14,495	8,793	5,702	(1,664)	7,366	1,984	9,350

[a] See Table 35.

[b] See Table 64.

[c] See Table 53.

[d] See Table 60.

[e] See Table 57.

[f] See Table 64.

[g] See Table 22a (Includes in-migration).

[h] See Table 41 where 1,664 will be needed by 1980 or about 166 per year plus 4 more or 170 the last year, i.e., 1,664 ÷ 10 = 166.4 per year.

Table 67

Projected Direct Patient Care Physician Needs (1971-80)

Year	Projected Physicians[a]	Growth[b]	Deaths[c]	Retirement[d]	Disability[e]	Out-Migration[f]	Estimated Demand	Supply[g]	Unmet Need	Optimum Care Unmet Need[h]	Total Unmet Need	Possible Foreign Trained Replacement[g]	Maximum Possible Need
1971	13,392	210	167	180	25	331	913	544	369	166	535	135	670
1972	13,693	301	171	182	25	339	1,018	614	404	166	570	148	718
1973	14,023	330	175	186	28	346	1,065	631	434	166	600	150	750
1974	14,297	274	179	191	29	355	1,028	676	352	166	518	161	679
1975	14,779	482	185	194	30	364	1,255	689	566	166	732	164	896
1976	15,217	438	190	199	32	374	1,233	750	483	166	649	178	827
1977	15,683	466	196	204	32	385	1,283	783	500	166	666	184	850
1978	16,192	509	202	211	35	396	1,353	829	524	166	690	192	882
1979	16,726	534	209	216	36	408	1,403	864	539	166	705	197	902
1980	17,264	538	216	222	37	419	1,432	877	555	170	725	201	926
Total	-	4,082	1,890	1,985	309	3,717	11,983	7,257	4,726	(1,664)	6,390	1,710	8,100

[a] See Table 35.

[b] See Table 64.

[c] See Table 53.

[d] See Table 60

[e] See Table 57

[f] See Table 64.

[g] See Table 22a (Includes in-migration)

[h] See Note h in Table 66.

Table 68

Projected Direct Patient Care General/Family Practice Physician Needs (1971-80)

Year	Projected Physicians[a]	Growth[b]	Deaths[c]	Retirement[d]	Disability[e]	Out-migration[f]	Estimated Demand	Supply[g]	Unmet Need	Optimum Care Unmet Need[h]	Total Unmet Need	Possible Foreign Trained Replacement[g]	Maximum Possible Need
1971	3,987	-46	78	75	6	37	196	138	58	245	303	25	328
1972	3,929	-58	79	76	7	36	198	153	45	257	302	25	327
1973	3,894	-35	80	76	8	35	199	164	35	234	269	29	298
1974	3,865	-29	80	77	8	34	199	172	27	228	255	29	284
1975	3,840	-25	81	77	9	34	201	176	25	224	249	29	278
1976	3,832	- 8	81	78	9	33	201	194	7	207	214	33	247
1977	3,833	1	81	78	9	33	202	205	(3)[i]	199	196	33	229
1978	3,844	11	81	77	9	32	210	220	(10)	199	189	33	222
1979	3,867	23	80	77	8	32	220	234	(14)	199	185	33	218
1980	3,893	26	80	76	8	31	221	240	(19)	200	181	38	219
Total		61	801	767	81	337	2,047	1,896	151	2,192	2,343	307	2,650

[a] See Table 35.

[b] See Table 34. Negative figures indicate a decrement rather than growth which is reflected in the Optimum Care Unmet Need column as in Note h, below.

[c] Based on Table 53 but represents arbitrary estimates based on knowledge that average age is rising as total declines.

[d] Based on Table 60 but represents an arbitrary estimate as in Note c, above.

[e] Based on Table 57 but represents an arbitrary estimate as in Notes c and d, above.

[f] See Table 64.

[g] See Table 22a (includes in-migration).

[h] See Table 41 where 2,192 will be needed by 1980 or about 199 to 200 per year plus the number needed to compensate negative growth, i.e., 199 + 46 = 245, 199 + 58 = 257, etc.

[i] Indicates supply exceeds demand if no effort to move to optimum level or to recoup loss in numbers is made. Loss alone is 201 physicians so 352 or 35 more per year is needed just to maintain projected growth.

Table 69

Projected Direct Patient Care Internal Medicine Needs (1971-80)

Year	Projected Physicians[a]	Growth[b]	Death[c]	Retirement[d]	Disability[e]	Out-migration[f]	Estimated Demand	Supply[g]	Unmet Need	Optimum Care Unmet Need[h]	Total Unmet Need	Possible Foreign Trained Replacement[g]	Maximum Possible Need
1971	1,393	27	16	19	2	42	106	65	41	62	103	18	121
1972	1,424	31	16	19	2	43	111	72	39	62	101	21	122
1973	1,459	35	16	19	3	44	117	75	42	62	104	21	125
1974	1,496	37	17	20	3	45	122	79	43	62	105	24	129
1975	1,540	44	17	20	3	46	130	86	44	62	106	24	130
1976	1,588	48	18	21	3	48	138	90	48	62	110	24	134
1977	1,640	52	18	22	3	49	144	93	51	62	113	26	139
1978	1,694	54	19	23	3	51	150	99	51	62	113	27	140
1979	1,750	56	20	23	3	52	154	101	53	62	115	28	143
1980	1,809	59	20	24	4	54	161	104	57	67	124	30	154
Total		443	177	210	29	474	1,333	864	469	625	1,094	243	1,337

[a] See Table 35.

[b] See Table 64.

[c] See Table 53.

[d] See Table 60.

[e] See Table 57.

[f] See Table 64.

[g] See Table 22a (includes in-migration).

[h] See Table 41 where 625 will be needed by 1980 or about 62 more per year on the average plus 5 more or 67 the last year, i.e., 625 ÷ 10 = 62.5 per year.

Table 70

Projected Direct Patient Care Pediatric Physician Needs (1971-80)

Year	Projected Physicians[a]	Growth[b]	Deaths[c]	Retirement[d]	Disability[e]	Out-migration[f]	Estimated Demand	Supply[g]	Unmet Need	Optimum Care Unmet Need[h]	Total Unmet Need	Possible Foreign Trained Replacement[g]	Maximum Possible Need
1971	631	8	5	4	1	29	47	43	4	19	23	6	29
1972	663	32	6	4	1	31	74	45	29	19	48	6	54
1973	698	35	6	4	2	32	79	49	30	19	49	6	55
1974	737	39	6	5	2	34	86	51	35	19	54	6	60
1975	778	41	6	5	2	36	90	55	35	19	54	6	60
1976	824	46	7	5	3	38	99	58	41	19	60	6	66
1977	871	47	7	5	3	40	102	61	41	19	60	6	66
1978	921	50	8	6	3	42	109	62	47	19	66	6	72
1979	973	52	8	6	3	45	114	66	48	19	67	6	73
1980	1,025	52	9	6	3	47	117	66	51	21	72	7	79
Total		402	68	50	23	374	917	556	361	192	553	61	614

[a] See Table 35.

[b] See Table 64.

[c] See Table 53.

[d] See Table 60.

[e] See Table 57.

[f] See Table 64.

[g] See Table 22a (includes in-migration).

[h] See Table 41 where 192 will be needed by 1980 or about 19 per year (21 the last year) on the average, i.e., 192 ÷ 10 = 19.2.

Table 71

Projected Direct Patient Care General Surgery Needs (1971-80)

Year	Projected Physicians[a]	Growth[b]	Deaths[c]	Retire-ment[d]	Dis-ability[e]	Out-migration[f]	Estimated Demand	Supply[g]	Unmet Need	Optimum Care Unmet Need[h]	Total Unmet Need	Possible Foreign Trained Re-placement[g]	Maximum Possible Need
1971	1,146	40	13	7	2	11	73	68	5	(41)[i]	(36)[i]	14	(22)[i]
1972	1,185	39	14	7	2	11	73	71	2	(41)	(39)	15	(24)
1973	1,230	45	14	8	2	12	81	75	6	(41)	(35)	15	(20)
1974	1,279	49	15	8	3	12	87	80	7	(41)	(34)	15	(19)
1975	1,329	50	16	8	3	13	90	80	10	(41)	(31)	15	(16)
1976	1,381	52	16	9	3	13	93	83	10	(41)	(31)	15	(16)
1977	1,442	61	17	9	3	14	104	92	12	(41)	(29)	15	(14)
1978	1,506	64	18	9	4	15	110	94	16	(41)	(25)	15	(10)
1979	1,574	68	18	10	4	15	115	99	16	(41)	(25)	15	(10)
1980	1,635	61	19	10	4	16	110	99	11	(49)	(38)	17	(21)
Total		529	153	85	30	132	929	841	88	(418)	(330)	152	(178)

[a] See Table 35.

[b] See Table 64.

[c] See Table 53.

[d] See Table 60.

[e] See Table 57.

[f] See Table 64.

[g] See Table 22a (includes in-migration).

[h] See Table 41 where there will be a surplus of 418 physicians by 1980 or 41 per year surplus (49 in 1980).

[i] Parentheses indicate surplus physicians over optimum.

Table 72

Projected Direct Patient Care Physician Need In Other Specialties (1971-80)

Year	Projected Physicians[a]	Growth[b]	Deaths[c]	Retirement[d]	Disability[e]	Out-migration[f]	Estimated Demand	Supply[g]	Unmet Need	Optimum Care Unmet Need[h]	Total Unmet Need	Possible Foreign Trained Replacement[g]	Maximum Possible Need
1971	6,238	184	69	75	14	224	566	274	292	(104)	188	72	260
1972	6,502	264	72	78	14	233	661	304	357	(104)	253	80	333
1973	6,762	260	74	81	15	243	673	310	363	(104)	259	81	340
1974	7,042	280	77	85	15	253	710	333	377	(104)	273	87	360
1975	7,329	287	81	88	16	263	735	338	397	(104)	293	88	381
1976	7,642	313	84	92	17	274	780	367	413	(104)	309	96	405
1977	7,963	321	88	96	18	286	809	380	429	(104)	325	99	424
1978	8,306	343	91	100	19	298	851	400	451	(104)	347	103	450
1979	8,659	353	95	104	20	310	882	414	468	(104)	364	106	470
1980	9,013	354	99	108	20	322	903	423	480	(112)	368	108	476
Total		2,959	830	907	168	2,706	7,570	3,543	4,027	(1,048)	2,979	920	3,899

[a] See Table 35.

[b] See Table 64.

[c] See Table 53.

[d] See Table 60.

[e] See Table 57.

[f] See Table 64.

[g] See Table 22a (includes in-migration).

[h] See Table 41 where there will be a surplus of 1,048 physicians by 1980 or an average excess of 104 per year (112 the last year).

[i] Parentheses indicate surplus physicians.

from the Medical Economics data found in Table 41 of Chapter IX have been entered into the need tables of this chapter, i.e., into the column entitled optimum care unmet need.

The total unmet need column of Tables 66 to 72 is then a result of summing the values of the preceding two columns. The figures in this column represent an estimate of our physician needs, if we continue to depend upon foreign-trained physicians and wish to optimize our medical care system.

These tables, in effect, assume that no geographic maldistribution problem exists and, therefore, specify only the number needed to redress the specialty maldistribution problem.

The last two columns of Tables 66 to 72 represent an attempt to estimate the maximum possible need that might result if we wished to optimize our medical care but could no longer utilize foreign-trained physicians to meet our active physician needs, either as a result of a policy decision on our part or a shutoff of supply by the foreign nations involved. For example, in Table 66 we see that we would need to produce or import, during the period 1971-80, 5,702 physicians in order to maintain the estimated probable growth, 7,366 physicians in order to meet optimum care standards, and 9,350 physicians would have to be produced or imported from other states if we ended our dependence on foreign-trained physicians. Such physicians now supply around 20 per cent of our new physicianseach year. For example, in Table 66, the number of foreign-trained physicians who would either enter medical practice between 1971 and 1980 is 1,984. This figure is simply added to the total unmet need figure of the preceding column to arrive at the maximum possible need figure found in the last column of the table.

Implications of Need Estimates For Medical Schools

Tables 73 through 79 are an attempt to estimate the increase in class size that would be needed for Pennsylvania to meet the optimum care standards of the total unmet need columns of Tables 66 to 72 or the maximum probable growth standards of the unmet need columns of Tables 66 to 72, i.e., how much larger would the classes have to be in order to meet these estimates of need without recourse to increased importation of foreign- and other state-trained physicians.

In general, these tables suggest that we would have to increase class sizes to 2.5 to 3 times their present size to meet the need or else find ways to, at a minimum, get some 87 per cent of our students to remain in the state and enter the various specialties according to our true needs (Table 73). To meet optimum care standards the state would have to get 100 per cent of its students to remain in Pennsylvania plus a concommitant 2 per cent increase in the projected graduate output (Table 73). This assumes that we will train doctors in specialties according to our actual specialty needs.

An increase in retention rate (holding power) seems likely to be feasible, but these figures suggest that we will also require some increase in class size. The required increase will shrink as the retention or holding power of the state is increased from the present figure of 35 per cent (Table 6).

The tables for physician subcategories assume that the present holding power of the state will remain the same. They also indicate where the training needs for increased specialty output and retention lie. General surgery, for example, would require virtually no increase in the present graduate output or the holding rate of Table 6.

Summary of Need Findings

The medical schools will have to be expanded more than is now projected if we are to meet our needs. The degree of expansion required will vary as the ability of the state to hold its graduates as practitioners within the state increases. At a minimum, we would have to produce or import around 2.5 to 3 times as many physicians as we now project in order to meet our needs unless we can increase our holding power with regard to our own graduates by, for example, increasing the proportion of Pennsylvania resident graduates or by increasing the number of medical students with a rural background.

Table 73

Active Physician Implications of Table 66 for Pennsylvania's Medical School Class Size or Physician Retention Rate

Year	Projected Pa. Graduates[a]	Projected Pa. Trained Supply[b]	Projected Total Unmet Need[c]	Total Needed	Class Size Increase for Optimum Care	Percentage of Projected Pa. Graduates Needed	Projected Minimum Unmet Need[c]	Minimum Total Need	Class Size Increase Required	Percentage of Projected Pa. Graduates Needed
1971	847	297	570	867[d]	2.9[e]	102[f]	404	701[d]	2.4[e]	83[f]
1972	935	328	654	982	3.0	105	488	816	2.5	87
1973	963	339	641	980	2.9	102	475	814	2.4	85
1974	1,031	362	759	1,121	3.1	109	593	955	2.6	93
1975	1,053	370	731	1,101	3.0	105	565	935	2.5	89
1976	1,143	402	753	1,155	2.9	101	587	989	2.5	87
1977	1,196	421	772	1,193	2.8	100	606	1,027	2.4	86
1978	1,264	447	807	1,254	2.8	99	641	1,088	2.4	86
1979	1,320	468	826	1,294	2.8	98	660	1,128	2.4	85
1980	1,340	474	853	1,327	2.8	99	683	1,157	2.4	86
Total	11,092	3,908	7,366	11,274	2.9	102	5,702	9,610	2.5	87

[a] See Table 4.

[b] See Table 22a (M.D. and D.O. final estimates).

[c] See Table 66, Total Unmet Need and/or Unmet Need.

[d] E.g., 297 + 570 = 867 or 404 + 297 = 701.

[e] E.g., 867 ÷ 297 = 2.9 or 701 ÷ 297 = 2.4.

[f] E.g., 867 ÷ 847 = 1.02 (1.02 per cent) or 701 ÷ 847 = 0.83 (83 per cent).

Table 74

Direct Patient Care Implications of Table 67 for Pennsylvania's Medical School Class Size or Physician Retention Rate

Year	Projected Pa. Graduates[a]	Projected Pa. Trained Supply[b]	Projected Total Unmet Need[c]	Total Needed	Class Size Increase for Optimum Care	Percentage of Projected Pa. Graduates Needed	Projected Minimum Unmet Need[c]	Minimum Total Need	Class Size Increase Required	Percentage of Projected Pa. Graduates Needed
1971	847	280	535	815[d]	2.9[e]	96[f]	369	649[d]	2.3[e]	77[f]
1972	935	311	570	881	2.8	94	404	715	2.3	76
1973	963	321	600	921	2.7	91	434	755	2.4	78
1974	1,031	343	518	861	2.5	84	352	695	2.0	67
1975	1,053	350	732	1,082	3.1	103	566	916	2.6	87
1976	1,143	381	649	1,030	2.7	90	483	864	2.3	76
1977	1,196	399	666	1,065	2.7	89	500	899	2.3	75
1978	1,264	424	690	1,114	2.6	88	524	948	2.2	75
1979	1,320	444	705	1,149	2.6	87	539	979	2.2	74
1980	1,340	450	725	1,175	2.6	88	555	1,005	2.2	75
Total	11,092	3,703	6,390	10,093	2.7	91	4,726	8,429	2.3	76

[a] See Table 4.

[b] See Table 22a (M.D. and D.O. final estimates).

[c] See Table 67, Total Unmet Need and/or Unmet Need.

[d] E.g., 280 + 535 = 815 or 280 + 369 = 649.

[e] E.g., 815 ÷ 280 = 2.9 or 649 ÷ 280 = 2.3.

[f] E.g., 815 ÷ 847 = 0.96 (96 per cent) or 649 ÷ 847 = 0.77 (77 per cent).

Table 75

Direct Care General/Family Practice Implications of Table 68 for Pennsylvania's Medical School Class Size of Physician Retention Rate

Year	Projected Pa. Graduates[a]	Projected Pa. Trained Supply[b]	Projected Total Unmet Need[c]	Total Needed	Class Size Increase For Required Optimum Care	Percentage of Projected Pa. Graduates Needed	Projected Minimum Unmet Need[d]	Minimum Total Need	Class Size Increase Required	Percentage of Projected Pa. Graduates Needed
1971	847	76	303	379[e]	5.0[f]	45[g]	242	318[e]	4.2[f]	38[g]
1972	935	87	302	389	4.5	42	256	343	3.9	37
1973	963	91	269	360	4.0	37	234	325	3.6	34
1974	1,031	97	255	352	3.6	34	228	325	3.4	32
1975	1,053	99	249	348	3.5	33	226	325	3.3	31
1976	1,143	109	214	323	3.0	28	209	318	2.9	28
1977	1,196	117	196	313	2.7	26	202	319	2.7	26
1978	1,264	127	189	316	2.5	25	210	337	2.7	27
1979	1,320	136	185	321	2.4	24	220	356	2.6	27
1980	1,340	137	181	318	2.3	24	221	358	2.6	27
Total	11,092	1,076	2,343	3,419	3.2	31	2,047	3,123	2.9	28

[a] See Table 4.

[b] See Table 22a (M.D. and D.O. final estimates).

[c] See Table 68, Total Unmet Need.

[d] Derived from Table 68 but assumes maintenance of the 1970 status quo and therefore, includes the decremental growth figures from the replacement due to Growth column.

[e] E.g., 703 + 303 = 379 or 242 + 76 = 318.

[f] E.g., 379 ÷ 76 = 5.0 or 318 ÷ 76 = 3.9.

[g] E.g., 379 ÷ 847 = 0.45 (45 per cent) or 318 ÷ 847 = 0.37 (37 per cent).

Table 76

Direct Care Internal Medicine Implications of Table 69 for Pennsylvania's Medical School Class Size or Physician Retention Rate

Year	Projected Pa. Graduates[a]	Projected Pa. Trained Supply[b]	Projected Total Unmet Need[c]	Total Needed	Class Size Increase for Optimum Care	Percentage of Projected Pa. Graduates Needed	Projected Minimum Unmet Need[c]	Minimum Total Need	Class Size Increase Required	Percentage of Projected Pa. Graduates Needed
1971	847	34	103	137[d]	4.0[e]	16[f]	41	75[d]	2.2[e]	9[f]
1972	935	37	101	138	3.7	15	39	76	2.1	8
1973	963	39	104	143	3.7	15	42	81	2.1	8
1974	1,031	40	105	145	3.6	14	43	83	2.1	8
1975	1,053	43	106	149	3.5	14	44	87	2.0	8
1976	1,143	47	110	157	3.3	14	48	95	2.0	8
1977	1,196	47	113	160	3.4	13	51	98	2.1	8
1978	1,264	50	113	163	3.3	13	51	101	2.0	8
1979	1,320	51	115	166	3.3	13	53	104	2.0	8
1980	1,340	52	124	176	3.4	13	57	109	2.1	8
Total	11,092	440	1,094	1,534	3.5	14	469	909	2.1	8

[a] See Table 4.

[b] See Table 22a (M.D. and D.O. final estimates).

[c] See Table 69, Total Unmet Need and/or Unmet Need.

[d] E.g., 34 + 103 = 137 or 34 + 41 = 75.

[e] E.g., 137 ÷ 34 = 4.0 or 75 ÷ 34 = 2.2.

[f] E.g., 137 ÷ 847 = 0.16 (16 per cent) or 75 ÷ 847 = 0.08 (8 per cent).

Table 77

Direct Care Pediatric Physician Implications of Table 70 for Pennsylvania's Medical School Class Size or Physician Retention Rate

Year	Projected Pa. Graduates[a]	Projected Pa. Trained Supply[b]	Projected Total Unmet Need[c]	Total Needed	Class Size Increase for Optimum Care	Percentage of Projected Pa. Graduates Needed	Projected Minimum Unmet Need[c]	Minimum Total Need	Class Size Increase Required	Percentage of Projected Pa. Graduates Needed
1971	847	25	23	48[d]	1.9[e]	6[f]	4	29[d]	1.2[e]	3[f]
1972	935	27	48	75	2.8	8	29	56	2.1	6
1973	963	29	49	78	2.7	8	30	59	2.0	6
1974	1,031	30	54	84	2.8	8	35	65	2.2	6
1975	1,053	31	54	85	2.7	8	35	66	2.1	6
1976	1,143	33	60	93	2.8	8	41	74	2.2	6
1977	1,196	35	60	95	2.7	8	41	76	2.2	6
1978	1,264	36	66	102	2.8	8	47	83	2.3	7
1979	1,320	38	67	105	2.8	8	48	86	2.3	7
1980	1,340	38	72	110	2.9	8	51	89	2.3	7
Total	11,092	306	553	853	2.8	8	361	667	2.2	6

[a] See Table 4.

[b] See Table 22a (M.D. and D.O. final estimates).

[c] See Table 70, Total Unmet Need and/or Unmet Need.

[d] E.g., 25 + 23 = 48 or 25 + 4 = 29.

[e] E.g., 48 ÷ 25 = 1.9 or 29 ÷ 25 = 1.2.

[f] E.g., 48 ÷ 847 = 0.06 (6 per cent) or 29 ÷ 847 = 0.03 (3 per cent).

Table 78

Direct Care General Surgery Implications of Table 71 for Pennsylvania's Medical School Class Size or Physician Retention Rate

Year	Projected Pa. Graduates[a]	Projected Pa. Trained Supply[b]	Projected Total Unmet Need[c]	Total Needed	Class Size Increase for Optimum Care	Percentage of Projected Pa. Graduates Needed	Projected Minimum Unmet Need[c]	Minimum Total Need	Class Size Increase Required	Percentage of Projected Pa. Graduates Needed
1971	847	31	(36)[d]	(-5)[e]	0.0[f]	0.0[g]	0(-41)[d]	(-10)[e]	0.0[f]	0[g]
1972	935	34	(39)	(-5)	0.0	0.0	0(-41)	(- 7)	0.0	0
1973	963	36	(35)	1	0.0	0.0	0(-41)	(- 5)	0.0	0
1974	1,031	38	(34)	4	0.1	0.4	0(-41)	(- 3)	0.0	0
1975	1,053	38	(31)	7	0.2	0.7	0(-41)	(- 3)	0.0	0
1976	1,143	39	(31)	8	0.2	0.7	0(-41)	(- 2)	0.0	0
1977	1,196	42	(29)	13	0.3	1.1	0(-41)	1	0.0	0
1978	1,264	44	(25)	19	0.4	1.5	0(-41)	3	0.1	0
1979	1,320	47	(25)	22	0.5	1.7	0(-41)	6	0.1	0
1980	1,340	47	(38)	9	0.2	0.7	0(-49)	(- 2)	0.0	0
Total	11,092	396	(323)	73	0.6	0.2	0(-418)	(-22)	0.0	0

[a] See Table 4.

[b] See Table 22a (M.D. and D.O. final estimates).

[c] See Table 71, Total Unmet Need and/or Unmet Need.

[d] Parentheses indicate surplus rather than Need.

[e] E.g., 31 + (-36) = (-5) or 31 + (-41) = (-10).

[f] E.g., (-5) ÷ 31 = 0 increase (actually fewer are needed) or (-10) ÷ 31 = 0.

[g] E.g., (-5) ÷ 847 = -0.006 (0 per cent increase) or (-10) ÷ 847 = 0.012 (0 per cent increase).

Table 79

Other Specialty Direct Care Implications of Table 72 for Pennsylvania's Medical School Class Size or Physician Retention Rate

Year	Projected Pa. Graduates[a]	Projected Pa. Trained Supply[b]	Projected Total Unmet Need[c]	Total Needed	Class Size Increase for Optimum Care	Percentage of Projected Pa. Graduates Needed	Projected Minimum Unmet Need[c]	Minimum Total Need	Class Size Increase Required	Percentage of Projected Pa. Graduates Needed
1971	847	134	188	322[d]	2.4[e]	38[f]	188	322[d]	2.4[e]	38[f]
1972	935	148	253	401	2.7	43	253	401	2.7	43
1973	963	151	259	410	2.7	43	259	410	2.7	43
1974	1,031	162	273	435	2.7	42	273	435	2.7	42
1975	1,053	165	293	458	2.8	43	293	458	2.8	43
1976	1,143	179	309	488	2.7	43	309	488	2.7	43
1977	1,196	186	325	511	2.7	43	325	511	2.7	43
1978	1,264	196	347	543	2.8	43	347	543	2.8	43
1979	1,320	203	364	567	2.8	43	364	567	2.8	43
1980	1,340	207	368	575	2.8	43	368	575	2.8	43
Total	11,092	1,731	2,979	4,710	2.7	43	2,979	4,710	2.7	43

[a] See Table 4.

[b] See Table 22a (M.D. and D.O. final estimates).

[c] Total Unmet Need. Also defines Minimum Unmet Need for this table since a surplus over the optimum exists.

[d] E.G., 134 + 188 = 322.

[e] E.G., 322 ÷ 134 = 2.7.

[f] E.G., 322 ÷ 847 = 0.38 (38 per cent).

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3. *How Many People to Support a Specialist?* **Medical Economics,** Oradell, N. J., October 30, 1967.
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CHAPTER XII

PENNSYLVANIA'S PHYSICIAN MALDISTRIBUTION PROBLEM

The intent of the present chapter is to examine available data concerning the issue of physician maldistribution and, if possible, estimate the current (1971) physician needs for each county and higher education planning region of the state. This should suggest the magnitude of the geographical distribution problem and identify the areas of greatest need with reference to the optimum care standards cited earlier.

In addition, some data regarding expressed preferences of recent Hershey Medical School graduates will be examined to see if any favorable trends can be observed that would suggest an improvement in the situation posed by the state's geographic maldistribution problem.

Age Maldistribution

Since physicians tend to avoid rural practice, it seems probable that some areas of the state will have a much higher median age for their physicians than would others. Table 80 gives the age distribution for physicians (male) by county and for the state as a whole. Table 81 then lists the number of physicians in each county, their median age and the ranking of each county with regard to median age. A rank of 1 indicates the highest median age (Sullivan County, 64.5 years) and a rank of 67 indicates the county with the lowest median age (Montour County, 37.44 years). The median age for all Pennsylvania physicians is given as 45.85, a figure that is close to the national average of 46 years.[7]

Table 81 also lists, as of 1971, by county, the number of physicians who appear likely to be engaged in full-time medicine (ages 30-74), their median age and their ranking by county. Sullivan County still ranks first with a median age of 64.5 years, but Forest County now ranks 67th with a median age of 39.5 years.

These figures may be seen as indirectly reflecting the severity of need for each county. They suggest that the high ranking counties will lose a higher proportion of their physicians through death, disability and retirement than will the lower ranking counties. They also suggest that these high ranking (high median age) counties will have more difficulty than others in attracting physicians to meet their needs. Table 81 further indicates that seven of the counties have a median age above 59.0 years (Adams, Cameron, Clarion, Pike, Sullivan, Wayne and Wyoming) and will, therefore, lose half of their 1971 male medical physicians through death, retirement or disability by 1980 or so. In addition 12 others will lose somewhere between 25 and 49 per cent of their male medical physicians (median age 55 to 59). These 12 are Bedford, Butler, Carbon, Crawford, Fayette, Franklin, Indiana, Jefferson, Lackawanna, Luzerne, Northumberland and Schuylkill.

Physician Regional Distribution

Table 82 summarizes for each higher education planning region and for each county in the region, the number of direct patient care medical physicians and doctors of osteopathy in each of the specialty categories emphasized in this report, i.e., general/family practice, internal medicine, general surgery, pediatrics and collectively the other specialties. Only those physicians in direct patient care are tabled since they are the crucial physicians in the problem of maldistribution.

The table also gives a 1972 population estimate (physician data is almost that of 1972, i.e., November 26, 1971) followed by a population per physician ratio for each county and region. For example, the general/family practice population to physician ratio for Bucks County is given as 2,963:1, the Region 1 (Delaware) overall ratio is 2,644:1 and the state's ratio at the end of the table is 2,936:1.

Estimates of the number of physicians needed by the counties and regions in 1972 were computed using the optimum Medical Economics ratios of Table 38.[1] These optimum level estimates are given in Table 82 for each county and region by specialty category. For example, the optimum number of general/family practice physicians for Bucks County would be 215, for Region 1 (Delaware), 1,958 and for the state as a whole, 2,936 direct patient care family physicians. The difference between the optimum number of physicians for a given region or county is, of course, an estimate of the region or county's unmet physician need as of 1972.

The optimum ratios of Table 38 could be applied to county population projections by Senier and Mulvihill[2] in order to estimate the optimum number of physicians needed for any county or region in 1980,

Table 80

Male Physician Age Distribution By County and State[a]

County	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99	100-104	Totals
Adams	0	0	0	2	2	3	6	3	6	3	4	2	2	1	1	0	0	35
Allegheny	9	375	415	329	361	40	286	224	216	164	90	52	26	17	3	0	0	2,907
Armstrong	0	1	0	5	2	3	10	3	6	4	1	1	2	0	0	0	0	38
Beaver	0	2	6	18	17	21	21	23	19	11	6	2	2	3	0	0	0	151
Bedford	0	1	0	3	0	3	3	2	4	3	0	2	2	0	0	0	0	23
Berks	0	16	24	51	37	56	40	38	41	32	16	2	8	4	1	1	0	367
Blair	0	13	19	33	17	17	15	21	18	7	13	1	6	1	2	0	0	183
Bradford	1	11	10	15	20	12	4	7	6	2	2	3	0	0	0	0	0	93
Bucks	0	12	37	56	68	43	41	21	17	15	5	7	0	1	1	0	0	324
Butler	0	2	3	9	12	10	6	12	11	8	9	2	2	1	1	0	0	88
Cambria	1	18	21	24	17	32	17	17	24	12	11	3	4	2	2	0	0	207
Cameron	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	2
Carbon	0	0	1	3	4	4	3	8	5	3	3	0	1	2	1	0	0	38
Centre	0	0	3	8	8	9	11	7	13	9	4	1	0	0	0	0	0	73
Chester	0	8	50	46	50	55	32	28	32	19	12	3	5	3	1	0	0	344
Clarion	0	0	1	0	0	0	2	0	2	1	0	1	0	1	0	0	0	8
Clearfield	0	1	1	1	5	11	3	8	8	0	3	1	1	0	0	0	0	43
Clinton	0	2	0	3	2	6	2	8	2	1	2	0	0	0	0	0	0	28
Columbia	0	1	3	3	8	2	8	7	4	2	1	1	0	0	1	0	0	41
Crawford	0	0	3	10	4	7	6	15	8	6	1	2	0	1	0	0	0	63
Cumberland	0	5	21	38	21	24	16	17	16	13	7	2	3	0	0	0	0	84
Dauphin	3	58	44	60	56	55	34	38	35	25	19	7	6	0	1	0	0	441
Delaware	3	79	104	88	121	113	104	104	44	47	33	13	6	4	4	0	0	867
Elk	0	0	2	3	5	5	5	5	3	1	0	1	0	0	0	0	0	28
Erie	1	11	22	27	33	41	41	31	18	16	12	5	4	1	0	0	0	263
Fayette	0	4	10	1	8	9	15	11	19	6	2	3	6	3	0	0	0	97
Forest	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	3
Franklin	0	1	5	6	9	8	10	10	17	4	6	3	2	0	0	0	0	81
Fulton	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	3
Greene	0	0	1	0	2	2	7	4	2	4	0	1	0	0	0	0	0	23
Huntingdon	0	0	0	3	2	5	4	4	4	1	2	0	0	0	0	0	0	25
Indiana	0	0	0	8	3	7	4	4	10	8	1	1	0	1	0	0	0	47
Jefferson	0	2	1	1	4	5	2	4	5	4	2	0	1	0	0	0	0	31
Juniata	0	0	1	0	1	1	1	1	0	1	0	1	0	1	0	0	0	8
Lackawanna	0	1	16	40	19	28	21	32	41	33	9	10	4	3	1	1	0	259
Lancaster	1	9	23	48	33	46	53	40	30	21	11	7	2	3	2	0	0	309
Lawrence	0	0	0	8	11	13	9	6	12	8	5	4	0	1	0	0	0	77
Lebanon	0	1	8	9	11	19	10	19	13	8	7	3	1	0	0	1	0	110
Lehigh	0	30	32	50	41	38	26	32	30	25	12	11	3	1	1	0	0	332
Luzerne	0	6	18	36	34	38	37	46	66	35	26	15	6	7	3	0	0	373
Lycoming	0	2	4	12	15	24	19	13	16	9	3	3	1	0	1	0	0	122
McKean	0	0	3	1	4	7	3	4	6	3	0	0	0	0	0	0	0	31
Mercer	0	1	8	10	12	20	17	18	9	5	0	2	6	0	2	0	0	110
Mifflin	0	0	0	1	4	7	7	3	6	3	1	0	0	0	0	0	0	32
Monroe	0	0	6	7	8	4	7	8	5	4	4	3	1	0	0	0	0	57
Montgomery	1	110	162	190	206	203	140	117	106	92	49	36	14	8	1	0	0	1,435
Montour	0	30	33	23	17	16	15	5	7	6	0	1	0	0	0	0	0	153
Northampton	1	6	25	28	39	41	29	35	32	11	9	5	4	2	0	0	0	268
Northumberland	0	1	3	2	4	9	7	5	7	10	5	2	0	0	0	0	0	55
Perry	0	0	0	0	2	0	4	0	0	1	1	0	1	1	0	0	0	10
Philadelphia	18	11,077	954	627	531	477	420	390	362	262	146	99	55	19	4	4	1	5,446
Pike	0	0	0	0	0	1	1	1	1	1	0	1	1	0	0	0	0	7
Potter	0	0	0	2	1	1	0	2	1	1	0	1	0	0	0	0	0	9
Schuylkill	0	5	10	11	14	19	10	12	27	15	7	13	4	0	0	0	1	148
Snyder	0	0	1	2	0	7	0	2	0	1	0	0	0	0	0	0	0	13
Somerset	0	2	2	4	6	5	5	2	6	2	0	3	0	1	0	0	0	38
Sullivan	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2
Susquehanna	0	2	1	1	1	2	4	2	3	3	0	0	0	0	0	0	0	19
Tioga	0	0	1	3	2	1	5	1	2	2	1	1	1	0	0	0	0	20
Union	0	2	1	2	6	2	1	4	1	1	3	1	0	0	0	0	0	24
Venango	0	0	6	4	6	8	1	5	7	3	5	0	3	0	0	0	0	48
Warren	0	3	5	8	8	10	7	6	3	6	3	3	0	0	0	0	0	62
Washington	0	8	14	13	27	17	19	23	18	13	8	3	4	1	0	0	0	168
Wayne	0	2	0	0	2	4	1	1	3	4	2	1	0	0	0	0	0	20
Westmoreland	0	8	15	41	38	42	31	26	25	24	11	5	0	2	1	0	0	269
Wyoming	0	2	1	1	0	0	0	2	2	2	0	0	0	0	0	0	0	13
York	0	36	35	36	32	24	31	19	24	24	8	3	2	2	0	0	0	276
Pennsylvania	39	1,967	2,196	2,075	2,038	2,042	1,680	1,365	1,487	1,074	603	360	202	100	35	7	2	17,472

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[a]Data from AMA tapes November 26, 1971. Data for median intervals are underlined.

Table 81

Total Number, Median Age and Rank Order of Physician Need Due to Death and Retirement for All Male Physicians in Pennsylvania and All Male Physicians in Active Independent Practice Age Range of 30-74 Years by County Residence

County	Total Male M.D.'s	Median Age Male M.D.'s	M.D. Withdrawal Need Ranking[a]	Total Male M.D.'s 30-74 Years	Median Age M.D.'s 30-74	30-74 Years Withdrawal Need Ranking[b]
Pennsylvania	17,472	45.85		14,760	47.10	
Adams	35	60.75	3.5	29	57.00	4.5
Allegheny	2,907	44.00	62	2,425	46.10	59
Armstrong	38	53.50	23	34	53.00	23
Beaver	151	52.20	32	142	51.60	31
Bedford	23	58.25	8	18	54.50	13
Berks	367	49.45	43	335	49.45	38
Blair	183	47.29	51	160	47.74	51
Bradford	93	41.88	64	78	43.00	64
Bucks	324	43.69	63	303	43.80	63
Butler	88	54.83	19	80	54.50	13
Cambria	207	47.73	50	177	48.33	47
Cameron	2	59.50	6	1	42.00	65
Carbon	38	57.00	9	33	55.44	8
Centre	73	53.36	24	72	53.14	22
Chester	344	46.14	57	324	45.95	61
Clarion	8	62.00	2	6	57.00	4.5
Clearfield	43	53.67	22	40	52.83	24
Clinton	28	52.00	34	26	54.50	13
Columbia	41	51.69	36	38	51.38	33
Crawford	63	55.00	18	60	54.50	13
Cumberland	184	45.96	58	174	45.96	60
Dauphin	441	44.45	60	366	46.59	57
Delaware	867	46.20	56	758	47.42	52
Elk	28	48.50	47	27	48.00	49.5
Erie	263	49.07	44	241	49.20	40
Fayette	97	55.18	16	81	53.67	20
Forest	3	39.50	66	2	39.50	67
Franklin	81	55.25	14	75	54.25	16
Fulton	3	47.00	53	3	47.00	55.5
Greene	23	54.13	21	22	53.79	18
Huntingdon	25	52.62	29	25	52.62	25
Indiana	47	56.38	12	45	55.13	9
Jefferson	31	55.13	17	28	55.75	6
Juniata	8	54.50	20	6	49.50	37
Lackawanna	259	55.20	15	239	48.43	44
Lancaster	309	48.90	45	285	48.69	41
Lawrence	77	53.11	26	72	51.72	30
Lebanon	115	53.00	27	104	52.00	28
Lehigh	332	46.21	55	286	47.13	54
Luzerne	373	56.40	11	336	55.04	10
Lycoming	122	50.55	39	115	50.16	36
McKean	31	50.33	40	31	50.33	21
Mercer	110	50.67	38	99	49.38	39
Mifflin	32	52.36	31	32	52.36	26
Monroe	57	52.00	34	53	50.57	35
Montgomery	1,[illegible]35	45.69	59	1,265	46.34	58
Montour	153	37.44	67	122	40.97	66
Northampton	268	48.65	46	250	48.40	45
Northumberland	55	56.00	13	52	55.50	7
Perry	10	53.25	25	8	52.00	28
Philadelphia	5,446	39.94	65	4,169	44.24	62
Pike	7	59.50	6	5	54.50	13
Potter	9	52.00	34	8	52.00	28
Schuylkill	148	56.58	10	125	53.75	19
Snyder	13	47.00	53	13	47.00	55.5
Somerset	38	49.50	41.5	32	48.50	43
Sullivan	2	64.50	1	2	64.50	1
Susquehanna	19	52.63	28	17	53.88	17
Tioga	20	52.50	30	18	51.50	32
Union	24	47.00	53	21	48.[illegible]	48
Venango	48	49.5	41.5	45	48.5[illegible]	42
Warren	62	48.0	49	56	48.00	49.5
Washington	168	50.82	37	152	50.82	34
Wayne	20	59.50	6	17	60.33	3
Westmoreland	269	48.37	48	253	48.37	46
Wyoming	13	60.75	3.5	[illegible]	63.25	2
York	276	44.34	61	233	47.31	53

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[a] This column represents a ranking of the counties based upon the deviation of the male M.D. median age for that county from the male M.D. median age for Pennsylvania as a whole. A ranking of one, for example, indicates a very high median age for male physicians in that county and by implication, a probably high need for physicians to replace those who die and retire over the next decade.

[b] This column is identical to that description in note "a" above but is based on those physicians who have completed training and are at the age of active practice, i.e., ages 30 to 74. It has been assumed that physicians retire late and that their ranking, therefore, best represents probable demand due to death and retirement of active practicing physicians in a given county.

Table 82

1970-71 Regional Distribution of Direct Care Physician (M.D. and D.O.)

Region[b] and County	Population[c]	GP/FP[d]	Pop/GP/FP Ratio	GP/FP Optimum Number[e]	GP/FP Need[f]	IM	Pop/IM Ratio	IM Optimum Number[e]	IM Need[f]	GS	Pop/GS Ratio	GS Optimum Number[e]	GS Need[f]	PD	Pop/PD Ratio	PD Optimum Number[e]	PD Need[f]	Other Specialties	Pop/Other Ratio
Region 1 (Delaware)																			
Bucks	429,621	145	2,963	215	70	21	20,458	86	65	26	16,524	43	17	22	19,528	43	21	32	13,426
Chester	287,233	89(4)	3,227	144	55	28	10,258	57	29	27	10,638	29	2	19	15,118	29	10	29	9,905
Delaware	606,890	237(4)	2,561	303	66	80	7,586	121	41	48	12,644	61	13	57	10,647	61	4	122	4,975
Montgomery	637,212	290(11)	2,197	319	29	116	5,493	127	11	82	7,771	64	(18)	77	8,275	64	(13)	129	4,940
Philadelphia	1,954,469	720(10)	2,715	977	257	443	4,412	391	(52)	236	8,282	195	(41)	228	8,572	195	(33)	450	4,343
Total	3,915,425	1,481(29)	2,644	1,958	477	688	5,683	783	94	419	9,345	392	(27)	403	9,715	392	(11)	762	5,138
Per Cent of Optimum[g]		76%				88%				107%				103%					
Region 2 (Lehigh Valley)																			
Berks	299,440	132(4)	2,269	150	18	29	10,326	60	31	20	14,972	30	10	9	33,271	30	21	52	5,759
Carbon	50,449	17	2,968	25	8	5	10,090	10	5	4	12,612	5	1	1	50,449	5	4	5	10,090
Lehigh	259,093	119(1)	2,177	130	34	21	12,338	52	31	17	15,241	26	9	13	19,930	26	13	38	6,818
Monroe	46,106	17(2)	2,712	23	6	5	9,221	9	4	5	9,221	5	0	3	15,369	5	2	7	6,587
Northampton	216,346	84(5)	2,576	108	24	45	4,808	43	(2)	21	10,302	22	1	12	18,029	22	10	28	7,727
Pike	12,032	4	3,008	6	2	--	**	2	2	--	**	1	1	--	**	1	1	1	12,032
Schuylkill	159,455	62	2,572	80	18	11	14,496	32	21	13	12,266	16	3	2	79,728	16	14	14	11,390
Total	1,042,921	435(12)	2,398	521	86	116	8,991	209	93	80	13,037	104	24	40	26,073	104	64	145	7,193
Per Cent of Optimum[g]		83%				56%				77%				38%					
Region 3 (Northeast)																			
Lackawanna	234,693	91	2,579	117	26	19	12,352	47	28	20	11,735	24	4	8	29,337	24	16	33	7,112
Luzerne	343,034	129(2)	2,659	172	43	39	8,796	69	30	35	9,801	34	(1)	9	38,115	34	25	40	8,576
Susquehanna	34,445	15(1)	2,296	17	2	3	11,482	7	4	2	17,223	3	1	--	**	3	3	1	34,445
Wayne	29,587	9	3,287	15	6	3	9,862	6	3	2	14,794	3	1	--	**	3	3	1	29,587
Wyoming	19,298	9	2,144	10	1	1	19,298	4	3	1	19,298	2	1	--	**	2	2	--	**
Total	661,057	253(3)	2,613	331	78	65	10,170	133	68	60	11,018	66	6	17	38,886	66	49	75	8,814
Per Cent of Optimum[g]		76%				49%				91%				26%					
Region 4 (Northern Tier)																			
Bradford	58,299	18	3,239	29	11	6	9,717	12	6	9	6,478	6	(3)	2	29,150	6	4	7	8,328
Lycoming	113,951	27	4,220	57	30	4	28,488	23	19	13	8,765	11	(2)	4	28,488	11	7	18	6,331
Sullivan	5,862	2	2,931	3	1	--	**	1	1	--	**	0	0	--	**	0	0	--	**
Tioga	40,092	14	2,864	20	6	--	**	8	8	3	13,364	4	1	--	**	4	4	1	40,092
Total	218,204	61	3,577	109	48	10	21,820	44	34	25	8,728	21	(4)	6	36,367	21	15	26	8,392
Per Cent of Optimum[g]		56%				23%				119%				29%					
Region 5 (Susquehanna)																			
Centre	105,746	28	3,777	53	25	5	21,149	21	16	6	17,624	11	5	4	26,437	11	7	10	10,575
Clearfield	74,250	16	4,641	37	21	4	18,563	15	11	8	9,281	7	(1)	1	74,250	7	6	5	14,850
Clinton	37,916	15	2,528	19	4	--	**	8	8	3	12,639	4	1	--	**	4	4	1	37,916
Columbia	55,451	16	3,466	28	12	2	27,726	11	9	4	13,863	6	2	1	55,451	6	5	6	9,242
Montour	16,444	8(1)	2,056	8	0	8	2,056	3	(5)	5	3,289	2	(3)	4	4,111	2	(2)	14	1,175
Northumberland	99,053	31(1)	3,195	50	19	2	49,527	20	18	5	19,811	10	5	1	99,053	10	9	9	11,006
Snyder	29,710	10	2,971	15	5	--	**	6	6	--	**	3	3	1	29,710	3	2	--	**
Union	29,074	9	3,230	15	6	2	14,537	6	4	3	9,691	3	0	1	29,074	3	2	3	9,691
Total	447,644	133(2)	3,366	225	92	23	19,463	90	67	34	13,166	46	12	13	34,434	46	33	48	9,326
Per Cent of Optimum[g]		59%				26%				74%				28%					

Table 82

(Continued)

Region^b and County	Population^c	GP/FP^d	Pop/GP/FP Ratio	GP/FP Optimum Number^e	GP/FP Need^f	IM	Pop/IM Ratio	IM Optimum Number^e	IM Need^f	GS	Pop/GS Ratio	GS Optimum Number^e	GS Need^f	PD	Pop/PD Ratio	PD Optimum Number^e	PD Need^f	Other Specialties	Pop/Other Ratio
Region 6 (Capitol)																			
Adams	57,474	23(1)	2,499	29	6	2	28,737	11	9	3	19,158	6	3	--	**	6	6	1	57,474
Cumberland	162,596	60(2)	2,710	81	21	14	11,614	32	18	13	12,507	16	3	10	16,260	16	6	22	7,391
Dauphin	225,237	94(5)	2,396	113	19	49	4,597	45	(4)	25	9,010	23	(2)	16	14,079	23	7	32	7,039
Franklin	102,328	31	3,301	51	20	3	34,109	20	17	7	14,618	10	3	3	34,109	10	7	7	14,618
Lancaster	324,667	158(4)	2,055	162	4	19	17,088	65	46	26	12,487	32	6	9	[illegible]	32	23	33	9,838
Lebanon	100,723	43(1)	2,342	[illegible]	7	11	9,157	20	9	10	10,072	10	0	2	[illegible]	10	8	10	10,072
Perry	28,835	11(3)	2,621	14	3	--	**	6	6	--	**	3	3	--	**	3	3	2	14,418
York	276,840	111(4)	2,494	138	27	24	11,535	55	31	16	17,303	28	12	8	34,605	28	20	33	8,389
Total	1,278,720	531(20)	2,408	638	107	122	10,481	254	132	100	12,787	128	28	48	26,640	128	80	140	9,134
Per Cent of Optimum^g		83%				48%				78%				38%					
Region 7 (Turnpike)																			
Bedford	42,424	8	5,303	21	13	4	10,606	8	4	3	14,141	4	1	--	**	4	4	1	42,424
Blair	135,599	48(3)	2,825	68	20	13	10,431	27	14	14	9,686	14	0	6	22,600	14	8	21	6,457
Cambria	186,502	60(3)	3,108	93	33	14	13,322	37	23	18	10,361	19	1	5	37,300	19	14	25	7,460
Fulton	10,754	4	2,689	5	1	--	**	2	2	1	10,754	1	0	--	**	1	1	--	**
Huntingdon	39,200	11	3,564	20	9	3	13,067	8	5	4	9,800	4	0	1	39,200	4	3	4	9,800
Juniata	16,755	7	2,394	8	1	--	**	3	3	--	**	2	2	--	**	2	2	--	**
Mifflin	45,488	20	2,274	23	3	2	22,744	9	7	4	11,372	5	1	1	45,488	5	4	4	11,372
Somerset	76,094	16(1)	4,756	38	22	1	76,094	15	14	9	8,455	8	(1)	--	**	8	8	3	25,365
Total	552,816	174(7)	3,177	276	102	37	14,941	109	72	53	10,430	57	4	13	42,524	57	44	58	9,531
Per Cent of Optimum^g		63%				34%				93%				23%					
Region 8 (Southwest)																			
Allegheny	1,612,309	385(11)	4,188	806	421	253	6,373	322	69	173	9,320	161	(12)	101	15,963	161	60	381	4,232
Armstrong	75,561	22(1)	3,435	38	16	--	**	15	15	4	18,890	8	4	1	75,561	8	7	3	25,187
Beaver	209,754	59(1)	3,555	105	46	12	17,480	42	30	13	16,135	21	8	5	41,951	21	16	15	13,984
Butler	129,711	30	4,324	65	35	9	14,412	26	17	9	14,412	13	4	3	43,237	13	10	9	14,412
Fayette	154,043	38	4,054	77	39	5	30,809	31	26	15	10,270	15	0	3	51,348	15	12	6	25,674
Greene	35,896	10(1)	3,590	18	8	3	11,965	7	4	4	8,974	4	0	--	**	4	4	2	17,948
Indiana	80,466	14(2)	5,748	40	26	3	26,822	16	13	9	8,941	8	(1)	2	40,233	8	6	5	16,093
Lawrence	107,523	26(1)	4,136	54	28	4	26,881	22	18	9	11,947	11	2	4	26,881	11	7	10	10,752
Mercer	127,746	41(3)	3,116	64	23	13	9,827	26	13	19	6,723	13	(6)	4	31,937	13	9	25	5,110
Washington	211,530	59(1)	3,585	106	47	12	17,628	42	30	15	14,102	21	6	7	30,219	21	14	10	21,153
Westmoreland	380,966	103(3)	3,699	190	87	28	13,606	76	48	26	14,653	38	12	8	47,621	38	30	27	14,110
Total	3,125,505	787(24)	3,971	1,563	776	342	9,139	625	283	296	10,559	313	17	138	22,649	313	175	493	6,340
Per Cent of Optimum^g		50%				55%				95%				44%					
Region 9 (North Central)																			
Cameron	7,011	3	2,337	4	1	--	**	1	1	--	**	1	1	--	**	1	1	--	**
Elk	37,844	7	5,406	19	12	4	9,461	8	4	3	12,615	4	1	1	37,844	4	3	4	9,461
McKean	51,770	13	3,982	26	13	5	10,354	10	5	4	12,943	5	1	2	25,885	5	3	3	17,257
Potter	16,326	6	2,721	8	2	--	**	3	3	1	16,326	1	0	--	**	1	1	1	16,326
Total	112,951	29(0)	3,895	57	28	9	12,550	22	13	8	14,119	11	3	3	37,650	11	8	8	14,119
Per Cent of Optimum^g		51%				41%				73%				27%					

Table 82

(Continued)

Region[b] and County	Population[c]	GP/FP[d]	Pop/GP/FP Ratio	GP/FP Optimum Number[e]	GF/GP Need[f]	IM	Pop/IM Ratio	IM Optimum Number[e]	IM Need[f]	GS	Pop/GS Ratio	GS Optimum Number[e]	GS Need[f]	PD	Pop/PD Ratio	PD Optimum Number[e]	PD Need[f]	Other Specialties	Pop/Other Ratio
Region 10																			
(Northwest)																			
Clarion	38,651	12	3,221	19	7	--	**	8	8	1	38,651	4	3	--	**	4	4	--	**
Crawford	81,787	24	3,408	41	17	7	11,684	16	9	9	9,087	8	(1)	1	81,787	8	7	7	11,684
Erie	266,091	83(3)	3,206	133	50	20	13,305	53	33	39	6,823	27	(12)	8	33,261	27	19	25	10,644
Forest	4,876	2	2,438	2	0	--	**	0	0	--	**	0	0	1	4,876	0	(1)	--	**
Jefferson	43,481	17	2,558	22	5	--	**	9	9	6	7,247	4	4	1	43,481	4	3	1	43,481
Venango	62,480	17	3,675	31	14	5	12,496	13	8	4	15,620	6	2	2	31,240	6	4	6	10,413
Warren	48,009	14(1)	3,429	24	10	1	48,009	10	9	5	9,602	5	0	2	24,004	5	3	6	8,002
Total	545,375	169(5)	3,227	272	103	33	16,527	109	76	64	8,521	54	(10)	15	36,358	54	39	45	12,119
Per Cent of Optimum[g]		62%				30%				119%				28%					
Pennsylvania	11,900,608	4,053(102)	2,936	5,950	1,897	1,446	8,230	2,380	934	1,139	10,448	1,190	51	696	17,099	1,190	494	1,800	6,611
Per Cent of Optimum[g]		68%				61%				96%				58%					
Optimum Ratio Used			(2,000)				(5,000)				(10,000)				(10,000)				

[a] Direct care physician data derived by the investigator from the following sources: American Medical Association physician tape as of November 26, 1971 and the 1970 Annual Directory of the American Osteopathic Association (non-member and members are listed).

[b] The regional breakdown is that of the Bureau of Higher Educational Planning and subsequently adopted by the Pennsylvania Department of Education as the accepted regional breakdown for the Office of Higher Education.

[c] From Senier and Mulvihill's (1972) projections.(5)

[d] Numbers in parentheses indicate the number of family practice physicians included in the total.

[e] The optimum number of physicians for the area in 1971 as defined by ratios given in the Journal of Medical Economics and found in Table 39 of this report.

[f] The discrepancy between the actual count and the optimum care number. A surplus is indicated by a number in parentheses. Basically a measure of absolute unmet need.

[g] An indication of relative need (based on optimum ratios) as indicated by what proportion of the optimum has been filled by existing physicians, i.e., the lower the percentage, the greater the relative need regardless of the number involved.

or in any year from 1972 to 1980. Unfortunately, no such projection of the probable growth of the number of physicians was achievable due to the lack of detailed historical physician data for the individual counties.

At the bottom of each regional data set is a percentage figure. For Region 1 it is 76 per cent for the category of general and family practice. This percentage figure is an estimate of the proportion of the optimum figure represented by the actual number of physicians in that region. As can be seen in Table 82, Regions 2 (Lehigh Valley) and 6 (Capitol) have the most favorable position since they have 83 per cent of the optimum number of general practice of family practice physicians. In contrast, Regions 8 (Southwest) and 9 (North Central) have the least favorable positions, with Region 8 having a 50 per cent of optimum figure and Region 9, a 51 per cent of optimum figure.

It should be noted here that the figures in parentheses for the GP/FP column of Table 82 indicate the portion of the total count that is represented by physicians certified as specialists in family practice. As can be seen, they were few in number in 1971 (102) and were found primarily in three highly urban regions, Region 1 (Philadelphia), Region 6 and Region 8 (Pittsburgh, Allegheny County). Apparently, this new type of basic care specialist, as with other specialists, is gravitating to the urban centers rather than the rural areas. This does not bode well with regard to their having an impact on the basic care physician geographic maldistribution problem.

Basic Care Need by County and Region

The percentage of optimum approach used for the regions in Table 82, seems to be a potentially valuable way of expressing the severity of a county's needs. It also seems evident that the fundamental problem for the rural and urban center poor is the need for basic entry level medical care. The rural areas, at least, cannot readily provide or support the hospital and medical facilities necessary for the practice of the secondary (referral) type of specialty, e.g., neurosurgery. However, patients requiring such services can and do go to major medical centers, by preference, for such highly specialized treatment.

If we consider general practice (or family practice), internal medicine and pediatrics as basic entry level specialty areas and general surgery as, potentially, serving both entry level surgical needs, and where necessary, general medical care needs, then it becomes feasible to analyze the relative position of the counties and higher education planning regions of the state with regard to these specialties in combination.

Table 83 lists, as of November 26, 1971, the number of such basic care specialists in each county or region, gives the population per physician ratio for that county or region, lists for each county or region the 1971 optimum figure for these specialists, and finally indicates what percentage of the optimum figure the regional or county's actual basic entry (GP, IM, PD, GS) physician totals represent. The higher the percentage figure the less the relative need for physicians, the lower the percentage figure, the higher the need for these types of physician.

Table 84 then lists the counties in order of rank from lowest relative need to highest relative need based upon the percentage of optimum figures of Table 83. As can be seen, the top 10 counties, out of a total of 67, had enough basic entry physicians to reach or exceed 75 per cent of the optimum figure based on the optimum ratios derived from the survey data published by Medical Economics.[1]

In contrast, the bottom 11 (two counties were tied for rank of 10th from the bottom) counties did not have enough basic entry physicians to account for more than 46 per cent, at most, of the optimum ratio for the counties in question.

Physician Need Area Maps

The percentage of the optimum number of physicians required as of 1971-72 are shown for each county in Figure 1 with shading designed to identify the counties and, generally, the area of the state where basic entry physician needs are the greatest and least or are moderately high or low.

As can be seen, when one includes general surgery as a basic entry specialty, the areas of major need (49 per cent of optimum or less) tend to be in the southwestern counties of Fayette, Somerset and Bedford along with a belt of counties running horizontally across the middle to upper portion of the state, i.e., Lawrence, Butler, Clarion, Armstrong, Indiana, Elk, Clearfield, Centre, Lycoming, Snyder, Northumberland and Sullivan. In addition, two other counties, Perry and Pike, fall into this severe need category. Apparently, many of the residents of these counties have to travel long distance to find the medical care that they lack in their own communities, but it is also true that every one of them has at least one adjoining county with an above average (59 per cent or better percentage population figure.)

Table 83

Estimates of M.D. and D.O. Basic Care Need by Region and County (G.P., F.P., I.M., G.S.) as Indicated by the Per Cent of the Optimum Number Actually Present in November 1971[a]

Region and County	Population[b]	Total Basic Care[c]	Population/ Physician Basic Care Ratio	Optimum Number[d]	Per Cent of Optimum[e]
I. (Delaware)					
Bucks	429,621	192	2,238	344	56
Chester	287,233	144	1,995	230	63
Delaware	606,890	365	1,663	486	75
Montgomery	637,212	488	1,306	510	96
Philadelphia	1,954,469	1,399	1,397	1,564	89
Combined	3,915,425	2,588	1,513	3,132	83
County Median[f]			1,663		75
II. (Lehigh Valley)					
Berks	299,440	181	1,654	240	75
Carbon	50,449	26	1,940	40	65
Lehigh	259,093	157	1,650	207	76
Monroe	46,106	27	1,708	37	73
Northampton	216,346	150	1,442	173	87
Pike	12,032	4	3,008	10	40
Schuylkill	159,455	86	1,854	128	67
Combined	1,042,921	631	1,653	834	76
County Median[f]			1,708		73
III. (Northeast)					
Lackawanna	234,693	130	1,805	188	69
Luzerne	343,034	203	1,690	274	74
Susquehanna	34,445	20	1,722	28	71
Wayne	29,587	14	2,113	24	58
Wyoming	19,298	11	1,754	15	73
Combined	661,057	378	1,749	529	71
County Median[f]			1,754		71
IV. (Northern Tier)					
Bradford	58,299	33	1,767	47	70
Lycoming	113,951	44	2,590	91	48
Sullivan	5,862	2	2,931	5	40
Tioga	40,092	17	2,358	32	53
Combined	218,204	96	2,273	175	55
County Median[f]			2,474		51

Table 83
(Continued)

Region and County	Population[b]	Total Basic Care[c]	Population/ Physician Basic Care Ratio	Optimum Number[d]	Per Cent of Optimum[e]
V. (Lackawanna)					
Centre	105,746	39	2,711	85	46
Clearfield	74,250	28	2,651	59	47
Clinton	37,916	18	2,106	30	60
Columbia	55,451	22	2,521	44	50
Montour	16,444	21	783	13	162
Northumberland	99,053	38	2,607	79	48
Snyder	29,710	10	2,971	24	42
Union	29,074	14	2,077	23	61
Combined	447,644	190	2,356	358	53
County Median[f]			2,564		49
VI. (Capitol)					
Adams	57,474	28	2,053	46	61
Cumberland	162,596	87	1,869	130	67
Dauphin	225,257	168	1,341	180	93
Franklin	102,328	41	2,496	82	50
Lancaster	324,667	203	1,599	260	78
Lebanon	100,723	64	1,574	81	79
Perry	28,835	11	2,621	23	48
York	276,840	151	1,833	221	68
Combined	1,278,720	753	1,698	1,023	74
County Median[f]			1,851		68
VII. (Turnpike)					
Bedford	42,424	15	2,828	34	44
Blair	135,599	75	1,808	108	69
Cambria	186,502	92	2,027	149	62
Fulton	10,754	5	2,115	9	56
Huntingdon	39,200	18	2,178	31	58
Juniata	16,755	7	2,394	13	54
Mifflin	45,488	26	1,750	36	72
Somerset	76,094	26	2,927	61	43
Combined	552,816	264	2,094	442	60
County Median[f]			2,147		57

Table 83
(Continued)

Region and County	Population[b]	Total Basic Care[c]	Population/ Physician Basic Care Ratio	Optimum Number[d]	Per Cent of Optimum[e]
VIII. (Southwest)					
Allegheny	1,612,309	811	1,988	1,290	63
Armstrong	75,561	26	2,906	60	43
Beaver	209,754	84	2,497	168	50
Butler	129,711	48	2,702	104	46
Fayette	154,043	58	2,656	123	47
Greene	35,896	17	2,112	29	59
Indiana	80,466	26	3,095	64	41
Lawrence	107,523	39	2,757	86	45
Mercer	127,746	73	1,750	102	72
Washington	211,530	86	2,460	169	51
Westmoreland	380,966	157	2,427	305	51
Combined	3,125,505	1,425	2,193	2,500	57
County Median[f]			2,656		50
IX. (North Central)					
Cameron	7,011	3	2,337	6	50
Elk	37,844	14	2,703	30	47
McKean	51,770	22	2,353	41	54
Potter	16,326	7	2,332	13	54
Combined	112,951	46	2,455	90	51
County Median[f]			2,345		54
X. (Northwest)					
Clarion	38,651	13	2,973	31	42
Crawford	81,787	40	2,045	65	62
Erie	266,091	142	1,874	213	67
Forest	4,876	2	2,438	4	50
Jefferson	43,481	23	1,890	35	66
Venango	62,480	26	2,403	50	52
Warren	48,009	20	2,400	38	53
Combined	545,375	266	2,050	436	61
County Median[f]			2,400		53
Pennsylvania	11,900,608	6,638	1,793	9,520	70
County Median[f]			2,112		58

Table 83
(Continued)

[a] Data derived from Table 82.

[b] See Table 82.

[c] Sum of physician counts for general practice/family practice, internal medicine and general surgery in Table 82. Assumes that general surgeons may also act as basic care initial entry physicians where general practitioners are scarce.

[d] Based upon an optimum ratio of 1,250 persons to a basic care physician as defined in note c, above. The ratio is obtained by combining the optimum ratios of Table 82 for general practice (2,000:1), internal medicine (5,000:1) and general surgery (10,000:1).

[e] Basic care total divided by the number required for optimum care at a ratio of 1,250:1.

[f] Median value for the counties in this region, i.e., the median county.

Table 84

Ranking of Counties by Increasing Need as Indicated by Basic Care Decreasing Percentage of Optimum Values[a]

Rank	County	Per Cent Optimum	Planning Region
1	Montour	162	5
2	Montgomery	96	1
3	Dauphin	93	6
4	Philadelphia	89	1
5	Northampton	87	2
6	Lebanon	79	6
7	Lancaster	78	6
8	Lehigh	76	2
9.5	Berks	75	2
9.5	Delaware	75	1
11	Luzerne	74	3
12.5	Monroe	73	2
12.5	Wyoming	73	3
14.5	Mercer	72	8
14.5	Mifflin	72	7
16	Susquehanna	71	3
17	Bradford	70	4
18.5	Blair	69	7
18.5	Lackawanna	69	3
20	York	68	6
22	Cumberland	67	6
22	Erie	67	10
22	Schuylkill	67	2
24	Jefferson	66	10
25	Carbon	65	2
26.5	Allegheny	63	8
26.5	Chester	63	1
28.5	Cambria	62	7
28.5	Crawford	62	10
30.5	Adams	61	6
30.5	Union	61	5
32	Clinton	60	5
33	Greene	59	8
34.5	Huntingdon	58	7
34.5	Wayne	58	3
36.5	Bucks	56	1
36.5	Fulton	56	7
39	Juniata	54	7
39	McKean	54	9
39	Potter	54	9
41.5	Tioga	53	9
41.5	Warren	53	10
43	Venango	52	10
44.5	Washington	51	8

Table 84
(contd.)

Rank	County	Per Cent Optimum	Planning Region
44.5	Westmoreland	51	8
48	Beaver	50	8
48	Cameron	50	9
48	Columbia	50	5
48	Forest	50	10
48	Franklin	50	6
52	Lycoming	48	4
52	Northumberland	48	5
52	Perry	48	6
55	Clearfield	47	5
55	Elk	47	9
55	Fayette	47	8
57.5	Butler	46	8
57.5	Centre	46	5
59	Lawrence	45	8
60	Bedford	44	7
61.5	Armstrong	43	8
61.5	Somerset	43	7
63.5	Clarion	42	10
63.5	Snyder	42	5
65	Indiana	41	8
66.5	Pike	40	2
66.5	Sullivan	40	4
-	Median County	58	-
-	Pennsylvania	70	-

[a] Based on findings in Table 83 for basic care physicians, i.e., general practice, internal medicine and general surgery.

Figure 2, gives essentially the same findings but reports on the percentage of optimum figures for the 10 higher education planning regions of the state. These regions, in order of their percentage of optimum figures from high to low, are as follows: Region 1, Delaware Valley, 83 per cent; Region 2, Lehigh Valley, 76 per cent; Region 6, Capitol, 74 per cent; Region 3, Northeast, 71 per cent; Region 10, Northwest, 61 per cent; Region 7, Turnpike, 60 per cent; Region 8, Southwest, 57 per cent; Region 4, Northern Tier, 55 per cent; Region 5, Susquehanna, 53 per cent and Region 9, North Central, 51 per cent.

Four regions had an average percentage of optimum figure that was at or below the county median of 58 per cent, i.e., the Southwestern Region with a percentage of 57 per cent, the Northern Tier Region with a percentage of 55 per cent, the Susquehanna Region with a figure of 53 per cent and the North Central Region with a percentage of 51 per cent. It should be noted that the figure for the Susquehanna Region would be much lower were it not for the effect of Montour County. This county is the site of the Geisinger Medical Center which is a major medical center of considerable national prestige. Any figures for Montour County are likely to reflect the large number of physicians serving this center. As a consequence, we see this small, relatively rural county with an incredible 162 per cent of the optimum number of physicians required to meet the needs of its population (see Figure 1). Geisinger Medical Center serves individuals from a large area of the state and possibly from outside the state. In addition, it provides a medical center that makes practice in other areas of Montour County more attractive to a basic care physician. Were it not for Montour County, the Susquehanna Region would be the most physician poor region of the state since most of the counties in this region are below the median county figure of 58 per cent. Actually, the most disadvantaged counties of the state, based on Figure 1, are Clarion, Armstrong, Elk, Clearfield, Fayette, Somerset and Bedford since these counties are surrounded by counties that have 70 per cent or less of the optimum ratio.

It is obvious that these maps (Figures 1 and 2) are closely related to what we would find if the maps had been based upon simple population per physician figures but they also reflect the degree to which the population per physician ratio approximates the presumed optimum figures. In contrast, Figures 3 and 4 are an attempt to illustrate the pattern of physician availability based upon a simple population per physician ratio.

Figure 3 gives the overall population per direct patient care physician (medical physician and doctors of osteopathy) ratios for each county as of 1971. As can be seen Figure 3, the median ratio for the counties is 1,411 people per direct care physician. For the state as a whole it is only 842 to 1. If we were to look at the state only, we would have come to the conclusion that Pennsylvania is in pretty good shape in regard to direct care physicians, especially since the state optimum is estimated at 643 people per direct patient care physician. The state ratio of 842 is only 31 per cent higher than the optimum. In contrast, the median county ratio is 119 per cent higher than the optimum ratio, or more than twice as high. This, of course, illustrates a basic fact. There is a high concentration of physicians, particularly specialists, in the more urban areas of the state.

In order to best evaluate the real needs of the counties, the basic entry level population to physician ratio seems likely to be the most revealing, particularly if we exclude the general surgeons who seem to be relatively plentiful and the pediatricians whose services may be met by family or general practice physicians. Figure 4 maps the population per basic entry physician ratios (GP, FP, and IM) for these three types of basic entry physician combined.

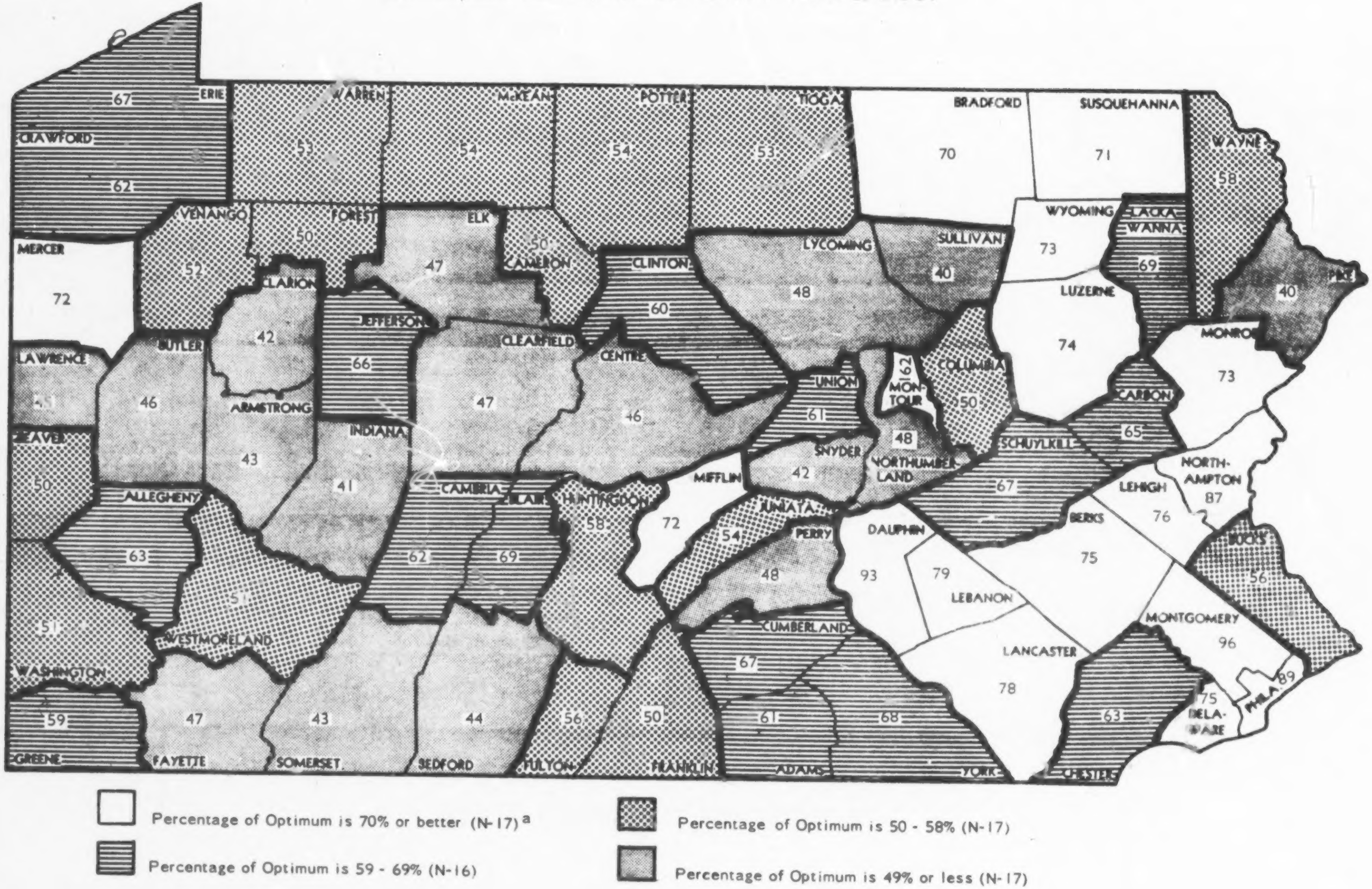
As can be seen in Figure 4, the findings are much like those of Figure ' with the Susquehanna Region and the Turnpike Region having some of the most unfavorable physician ratios. The statewide ratio for these physicians is 2,164 people per physician while the median county ratio is 2,586 per physician. The optimum figure, according to the Medical Economics survey[1] for these physicians combined is 1,429 to 1.

As might be expected, Montour County had a better than optimum ratio of 1,0182:1 and Dauphin, Montgomery, Northampton, Philadelphia, Lancaster, Lehigh, Berks, Susquehanna, Delaware, Wyoming and Mifflin approximated the optimum, in that order, ranging from Dauphin which had a ratio only 10 per cent above the optimum to Mifflin which was 45 per cent above the optimum.

In contrast, the 10 most disadvantaged counties, beginning with the most disadvantaged, were Indiana (4,733), Somerset (4,476), Lycoming (3,676), Lawrence (3,584), Fayette (3,582), Bedford (3,535), Armstrong (3,435), Butler (3,326), Clarion (3,221) and Warren (3,201). Indiana (4,733:1) had a population per physician figure that was 231 per cent higher than the

FIGURE 1

Areas of Physician Concentration and Need Based Upon the Percentage of Optimum Basic Care Physicians as Listed in Tables 83 and 84


ERIE 67
CRAWFORD 62
MERCER 72
LAWRENCE 51
BEAVER 50
WASHINGTON 51
GREENE 59
VENANGO 52
BUTLER 46
ALLEGHENY 63
WESTMORELAND 57
FAYETTE 47
WARREN 53
FOREST 50
CLARION
ARMSTRONG 42 43
INDIANA 41
SOMERSET 43
McKEAN 54
ELK 47
JEFFERSON 66
CLEARFIELD 47
CAMBRIA 62
BLAIR 69
BEDFORD 44
POTTER 54
CAMERON 50
CENTRE 46
CLINTON 60
HUNTINGDON 58
FULTON 56
FRANKLIN 50
TIOGA 53
LYCOMING 48
SULLIVAN 40
UNION 61
SNYDER 42
MIFFLIN 72
JUNIATA 54
PERRY 48
CUMBERLAND 67
ADAMS 61
YORK 68
BRADFORD 70
SUSQUEHANNA 71
WYOMING 73
LUZERNE 74
LACKAWANNA 69
WAYNE 58
PIKE 40
MONTOUR 162
COLUMBIA 50
NORTHUMBERLAND 48
SCHUYLKILL 67
CARBON 65
MONROE 73
DAUPHIN 93
LEBANON 79
LANCASTER 78
BERKS 75
LEHIGH 76
NORTHAMPTON 87
BUCKS 56
MONTGOMERY 96
CHESTER 63
DELAWARE 75
PHILA. 89

□ Percentage of Optimum is 70% or better (N-17)[a]

▤ Percentage of Optimum is 59 - 69% (N-16)

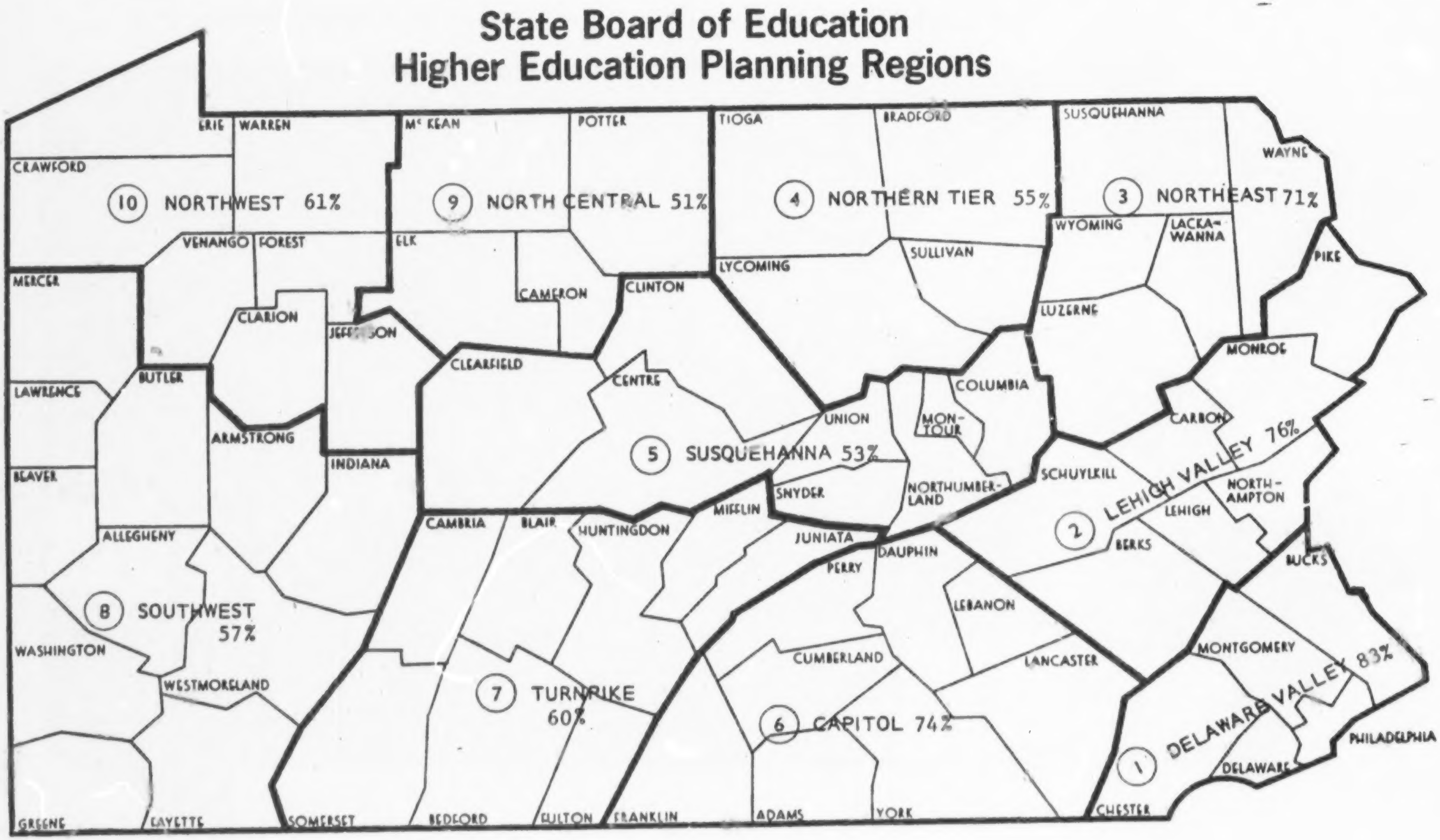
▩ Percentage of Optimum is 50 - 58% (N-17)

▦ Percentage of Optimum is 49% or less (N-17)

[a]Since the percentage value for Pennsylvania as a whole is 70% and the median of the counties if 58% it is interesting to note how well the four quartile ranges match these values as cutoff points.

FIGURE 2

Physician Concentration and Need for Each Higher Education Planning Region With the Overall Percentage of the Optimum Basic Care (GP, FP, IM, GS) Figure Given for Each Region[a]

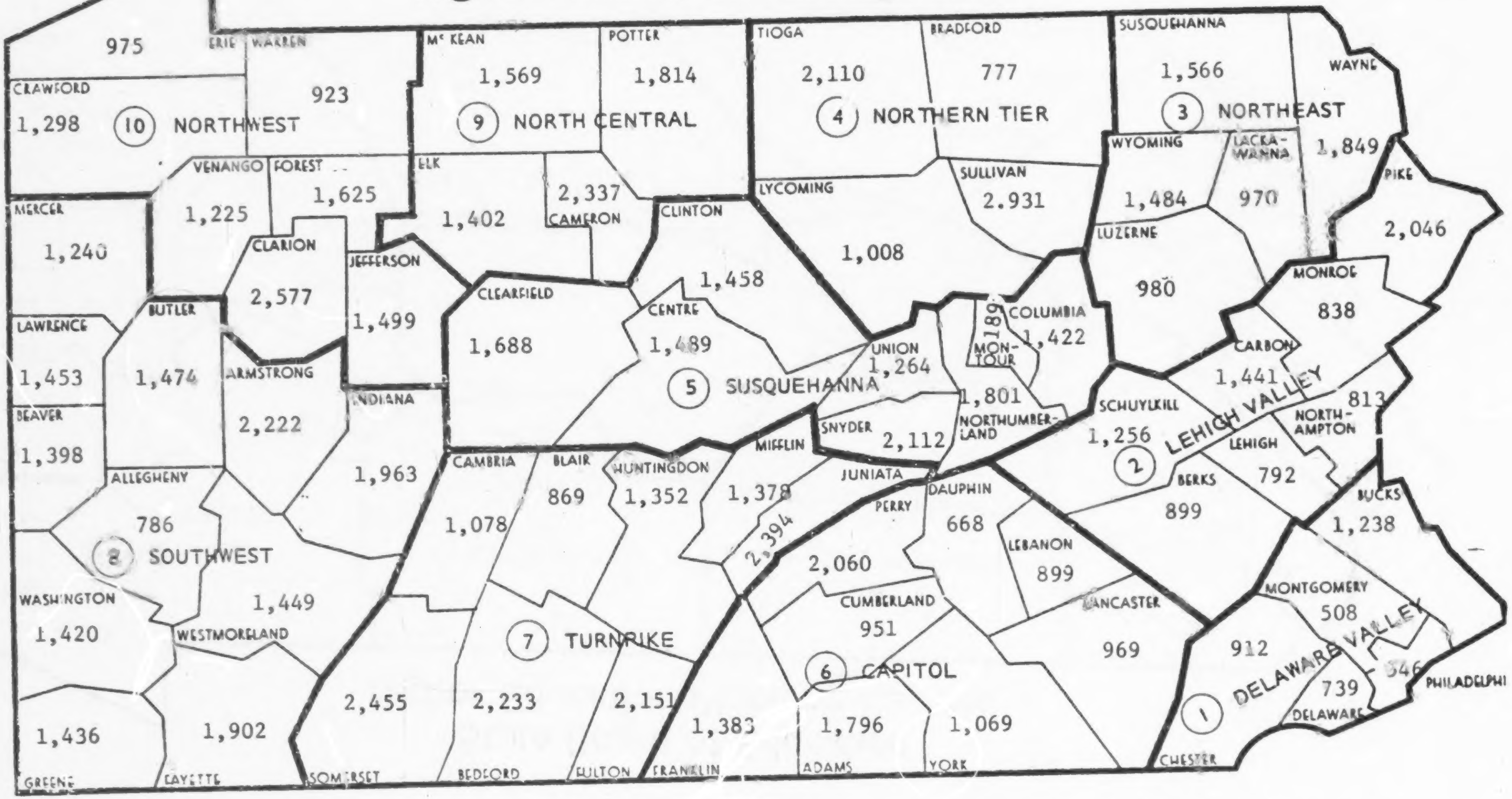

State Board of Education
Higher Education Planning Regions
ERIE
WARREN
CRAWFORD
⑩ NORTHWEST 61%
MERCER
VENANGO
FOREST
CLARION
JEFFERSON
LAWRENCE
BUTLER
ARMSTRONG
BEAVER
INDIANA
ALLEGHENY
⑧ SOUTHWEST 57%
WASHINGTON
WESTMORELAND
GREENE
FAYETTE
SOMERSET
Mc KEAN
POTTER
⑨ NORTH CENTRAL 51%
ELK
CAMERON
CLINTON
CLEARFIELD
CENTRE
CAMBRIA
BLAIR
HUNTINGDON
⑦ TURNPIKE 60%
BEDFORD
FULTON
FRANKLIN
TIOGA
BRADFORD
④ NORTHERN TIER 55%
LYCOMING
SULLIVAN
UNION
⑤ SUSQUEHANNA 53%
SNYDER
MIFFLIN
JUNIATA
MON-TOUR
COLUMBIA
NORTHUMBER-LAND
PERRY
DAUPHIN
CUMBERLAND
⑥ CAPITOL 74%
ADAMS
YORK
LEBANON
LANCASTER
SUSQUEHANNA
WAYNE
③ NORTHEAST 71%
WYOMING
LACKA-WANNA
LUZERNE
PIKE
MONROE
CARBON
SCHUYLKILL
② LEHIGH VALLEY 76%
LEHIGH
NORTH-AMPTON
BERKS
BUCKS
MONTGOMERY
① DELAWARE VALLEY 83%
PHILADELPHIA
DELAWARE
CHESTER

[a]Based on Table 83.

FIGURE 3

Direct Patient Care Population Per Physician Ratios[a]

State Board of Education Higher Education Planning Regions



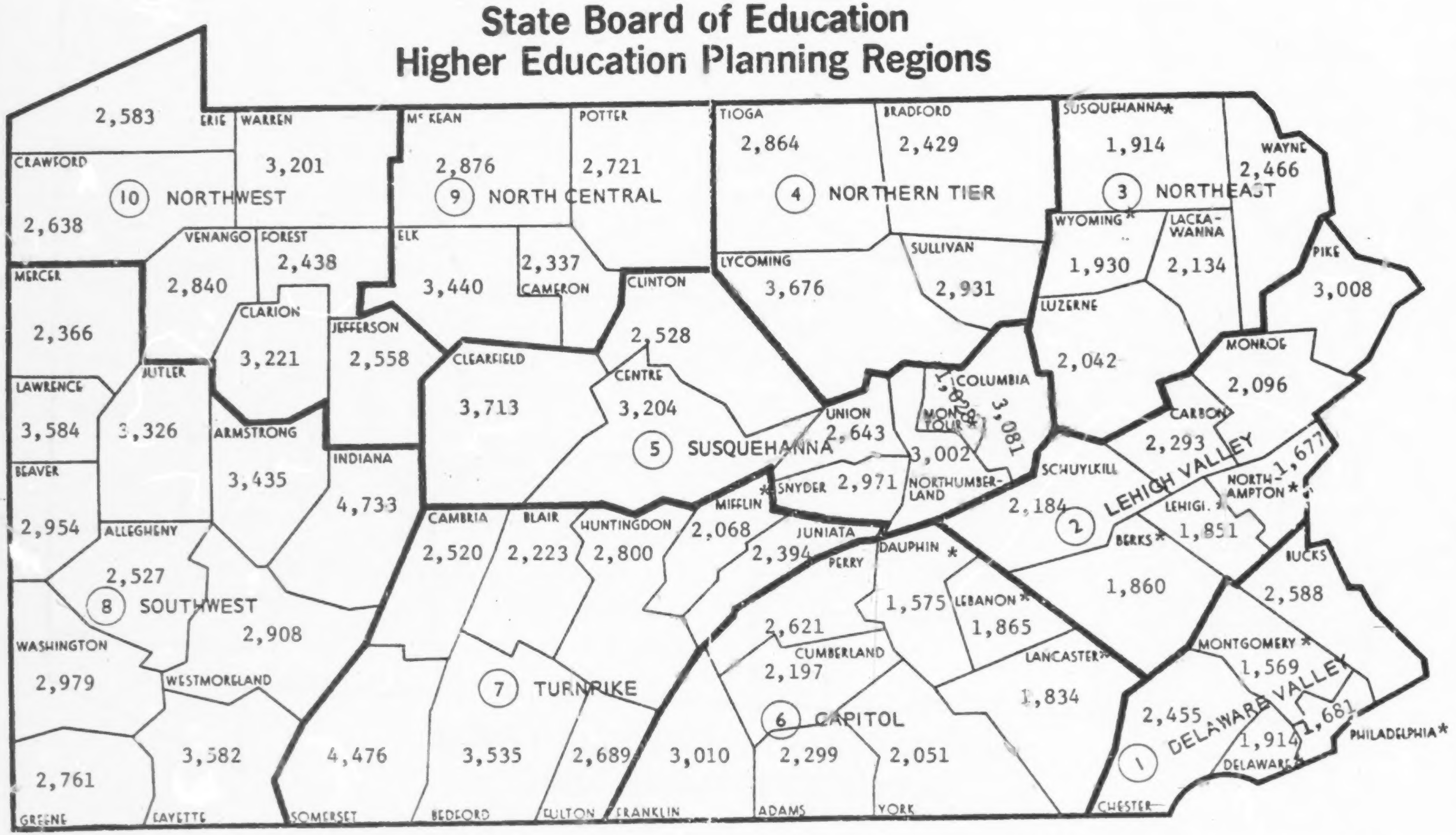
975
ERIE
WARREN
923
CRAWFORD
1,298
⑩ NORTHWEST
M^c KEAN
1,569
POTTER
1,814
⑨ NORTH CENTRAL
TIOGA
2,110
BRADFORD
777
④ NORTHERN TIER
SUSQUEHANNA
1,566
③ NORTHEAST
WAYNE
1,849
WYOMING
1,484
LACKA-WANNA
970
PIKE
2,046
VENANGO
1,225
FOREST
1,625
ELK
1,402
2,337
CAMERON
CLINTON
1,458
LYCOMING
1,008
SULLIVAN
2.931
LUZERNE
980
MONROE
838
MERCER
1,240
CLARION
2,577
JEFFERSON
1,499
CLEARFIELD
1,688
CENTRE
1,489
⑤ SUSQUEHANNA
UNION
1,264
MON-TOUR
189
COLUMBIA
1,422
CARBON
1,441
LAWRENCE
1,453
BUTLER
1,474
ARMSTRONG
2,222
INDIANA
1,963
SNYDER
2,112
1,801
NORTHUMBER-LAND
SCHUYLKILL
1,256
② LEHIGH VALLEY
NORTH-AMPTON
813
LEHIGH
792
BEAVER
1,398
ALLEGHENY
786
⑧ SOUTHWEST
CAMBRIA
1,078
BLAIR
869
HUNTINGDON
1,352
MIFFLIN
1,378
JUNIATA
2,394
DAUPHIN
668
PERRY
2,060
BERKS
899
BUCKS
1,238
LEBANON
899
WASHINGTON
1,420
1,449
WESTMORELAND
⑦ TURNPIKE
CUMBERLAND
951
LANCASTER
969
MONTGOMERY
508
912
DELAWARE VALLEY
⑥ CAPITOL
739
546
PHILADELPHI
DELAWARE
①
1,436
1,902
2,455
2,233
2,151
1,383
1,796
1,069
GREENE
FAYETTE
SOMERSET
BEDFORD
FULTON
FRANKLIN
ADAMS
YORK
CHESTER

[a] Based on a count of osteopaths by the Bureau of the Budget, Program Audit Division and AMA physician tape count (November 26, 1971) in combination with population projections for 1971 by Senier and Mulvihill[2]

The overall ratio for Pennsylvania is: 842 to 1, the median county figure is: 1,411 to 1 and the optimum ratio is: 643 to 1.

FIGURE 4

Basic Care (GP, FM, IM) Population Per Physician Ratios[a]


State Board of Education
Higher Education Planning Regions
ERIE 2,583
CRAWFORD 2,638
WARREN 3,201
⑩ NORTHWEST
MERCER 2,366
VENANGO 2,840
FOREST 2,438
CLARION 3,221
LAWRENCE 3,584
BUTLER 3,326
ARMSTRONG 3,435
JEFFERSON 2,558
INDIANA 4,733
BEAVER 2,954
ALLEGHENY 2,527
⑧ SOUTHWEST
WESTMORELAND 2,908
WASHINGTON 2,979
GREENE 2,761
FAYETTE 3,582
Mc KEAN 2,876
POTTER 2,721
⑨ NORTH CENTRAL
ELK 3,440
CAMERON 2,337
CLINTON 2,528
CLEARFIELD 3,713
CENTRE 3,204
⑤ SUSQUEHANNA
UNION 2,643
SNYDER 2,971
MIFFLIN* 2,068
JUNIATA 2,394
NORTHUMBERLAND 3,002
MONTOUR* 1,028
COLUMBIA 3,081
CAMBRIA 2,520
BLAIR 2,223
HUNTINGDON 2,800
⑦ TURNPIKE
SOMERSET 4,476
BEDFORD 3,535
FULTON 2,689
FRANKLIN 3,010
TIOGA 2,864
BRADFORD 2,429
④ NORTHERN TIER
LYCOMING 3,676
SULLIVAN 2,931
SUSQUEHANNA* 1,914
③ NORTHEAST
WAYNE 2,466
WYOMING* 1,930
LACKAWANNA 2,134
PIKE 3,008
LUZERNE 2,042
MONROE 2,096
CARBON 2,293
② LEHIGH VALLEY
SCHUYLKILL 2,184
NORTHAMPTON* 1,677
LEHIGH* 1,851
BERKS* 1,860
PERRY 2,621
CUMBERLAND 2,197
DAUPHIN* 1,575
LEBANON* 1,865
LANCASTER* 1,834
⑥ CAPITOL
ADAMS 2,299
YORK 2,051
BUCKS 2,588
MONTGOMERY* 1,569
① DELAWARE VALLEY
CHESTER 2,455
DELAWARE* 1,914
PHILADELPHIA* 1,681

[a]The overall ratio for Pennsylvania is: 2,164 to 1, the median county ratio is: 2,586 to 1 and the optimum ratio for this combination of specialties is 1,429 to 1. All entries are based on Table 82 of this report.

*Ratios approaching the optimum ratio of 1,429:1

optimum figure and 83 per cent higher than the county median figure of 2,586:1. The 10th ranking county, Warren (3,201:1), had a population per physician figure that was still 124 per cent larger than the optimum figure of 1,429:1. Warren was also 24 per cent higher than the median county figure of 2,586:1 and 48 per cent higher than the overall average state ratio of 2,164:1.

The Future of the Maldistribution Issue

It seems clear from the data presented that the basic problem for Pennsylvania lies at least as much in the maldistribution of physicians, especially basic entry level physicians, as it does in the overall need for physicians. As suggested in Chapter I, the state will have to take steps to encourage physicians to enter practice in the needed specialties and to settle in the rural and other impacted areas of the state.

How this is to be done remains an open issue and a difficult problem to solve within our free choice, entrepreneur-oriented medical system. As pointed out in Chapter III, it seems doubtful that loan repayment forgiveness for practice in needed areas or increased enrollment of Pennsylvania's rural medical school applicants will really solve the problem unless we also make practice in rural areas satisfying and attractive in the long run. The question is, are our medical students likely to respond to such efforts? Would they prefer rural practice, other things being equal? Is group practice, which may be the best approach to rural needs, attractive to them?

A Survey of Hershey Medical School Graduates

The Hershey Medical School of Pennsylvania carried out a survey of its 33 graduates of 1971 in order to determine, one year later, the location of their residency (in-state, out-of-state), the specialty area of the residency and the change, if any, in their specialty choice since graduation a year before.

In addition, questions were asked as to their preferred geographic location upon completion of their residency and reasons for their choice.

The medical school officials were kind enough to make the raw data available to the author of this report. These data have been analyzed and pertinent findings for the purposes of this study are found in Tables 85 to 88. Hopefully, the results will not be untypical of those for graduates of other medical schools.

Location of Residency Training

Table 85 indicates the locale of the residencies of 25 of the 33 graduates of 1971. Presumably, eight either did not respond or were not in a residency position at that time.

As can be seen in Part A of Table 85, 60 per cent of the basic care specialists (family practice, internal medicine, pediatrics, general surgery, ophthalmology, eye, nose and throat) went out of the state for their residency training. To a somewhat greater extent, the other specialties (neurology, pathology, psychiatry, anesthesiology, gastro-intestinal, nuclear medicine, research) also left the state (70 per cent).

The basic care specialists who tended to remain in Pennsylvania for residency training (Part B, Table 85) were the family medicine practitioners, the general surgeons and, to some extent (50 per cent), the pediatricians. Of the other specialists (Part C, Table 85), only the psychiatrists and the anesthesiologist tended to remain in the state for residency training. Whether these findings are a matter of preference or a symptom of a lack of high quality residency training opportunities in the state could not be ascertained from the responses.

Changes in Medical Practice Plans

Since the survey was a one-year follow-up and data as to the original choice of the graduates was included, it was possible to analyze the change in plans that took place in the graduates during the year following graduation. Table 86 summarizes the basic data regarding the graduation and postgraduation preferences of the respondents.

We can see from Table 86 that, overall, the basic care specialties lost ground to medical-surgical- and research-oriented activity with the exception of family practice which gained by one physician, i.e., from 3 to 4, or an increase from 9 per cent of the graduating class to 12 per cent. This is, of course, a hopeful finding in that the long-term percentage holding power of the state has been, in the 1960s, only 8 per cent for general practice. We can hope that this higher and increasing proportion of entry into family practice and the tendency to remain in the state for training will generalize to the graduates of other medical schools and permit a larger retention of such specialists for practice in the state than we have been able to project in this study.

Table 85

An Analysis of Location of Residency for Hershey 1971 Graduates for Whom Data Was Available

A. Basic Care vs. Specialties

	Basic Care	Specialties	Total
Penna.	6(40%)	3(30%)	9(36%)
Out-State	9(60%)	7(70%)	16(64%)
Total	15(100%)	10(100%)	25(100%)

B. Basic Care

	Family Practice	Internal Medicine	Pediatrics	General Surgery	Ophthalmology	Eye, Nose & Throat	Total
Penna.	4(100%)	0	1(50%)	1(100%)	0	0	6(40%)
Out-State	0	6(100%)	1(50%)	0	1(100%)	1(100%)	9(60%)
Total	4(100%)	6(100%)	2(100%)	1(100%)	1(100%)	1(100%)	15(100%)

C. Specialties

	Neurology	Pathology	Psychiatry	Anesthesiology	Gastro-Intest.	Nuclear Medicine	Research	Total
Penna.	0	0	2(67%)	1(100%)	0	0	0	3(30%)
Out-State	1(100%)	2	1(33%)	0	1(100%)	1(100%)	1(100%)	7(70%)
Total	1(100%)	2	3(100%)	1(100%)	1(100%)	1(100%)	1(100%)	10(100%)

Table 86

An Analysis of the Change in Medical Practice Plans of the 1971 Graduating Class at the Hershey Medical School

Specialty Area	Number at Graduation	Distribution Per Cent	Number One Year Later	Distribution Per Cent	Percentage Distribution Change
Basic Care	22	67	17	52	-15
Family Practice	3	9	4	12	+ 3
Internal Medicine	12	37	8	25	-12
FP and IM Combined	15	46	12	37	- 9
Pediatrics	4	12	3	9	- 3
General Surgery	2	6	1	3	- 3
Ophthalmology	1	3	1	3	0
Medical-Surgical	9	27	11	33	+ 6
Neurology	1	3	1	3	0
Pathology	1	3	0	0	- 3
Psychiatry	3	9	3	9	0
Plastic Surgery	1	3	0	0	- 3
Other	0	0	4	12	+12
Research and Academic	2	6	5	15	+ 9
No Response	3	9	(3)[a]	9	0
Combined	33	100	33	100	-

---

[a] No response was received to the second survey. We assume here that no change has taken place.

Choice of Geographic Location and Type of Practice

Table 87 summarizes the respondents indication of the type of geographic location in which they would prefer to practice and the type of practice preferred (solo, group, hospital) broken down by basic care and medical specialties other than basic care. As can be seen, only one of the four family practice specialists indicated an urban choice. It is not clear whether this choice of urban practice is based upon a desire to work in the inner-city (ghetto area) environment or is simply a preference for the larger city. It is perhaps significant in this connection that a suburban practice was not chosen. The pediatricians, on the other hand, chose the urban locale. This is interesting, to say the least. It is, possibly, a confirmation of the comments made by Dr. Nicholas M. Nelson, a pediatrician at Hershey Medical School, to the effect that a pediatrician is so badly needed in rural areas that he is swamped by the sheer physical labor demanded and that, therefore, rural pediatric practice is often avoided or eventually abandoned.[3] Presumably such practice will continue to be avoided until the supply of pediatricians becomes such that enough are available to provide optimum levels of care even in rural areas. Group practice by two or more pediatricians in a strategically located rural area might avoid the excessive demand (no vacations, night calls) problem described by Dr. Nelson.[3]

The more specialized basic care physicians (internal medicine, opthalmology, and eye, nose, throat) were the ones who chose a suburban location. Although only 25 per cent of the internal medicine respondents chose a suburban location, 100 per cent of the opthalmologists and otolaryngologists did indicate a preference for suburban practice. It is interesting to note, also, that 12 of the 13 basic care physicians who indicated their choice of type of practice chose group practice. None of them indicated their choice as the solo practice of medicine. A similar pattern was observed for the other than basic care specialties where we find (Part B.,Table 87) that 67 per cent indicated group practice as their preference and not one listed solo practice. The remaining 33 per cent chose the hospital as their work locale. As might be expected, the other than basic care specialists indicated an urban or suburban locale as their preference (13 per cent suburban, 62 per cent urban) rather than a rural practice. The 25 per cent rural preference is less than half of that for the basic care physicians as a whole, where 57 per cent indicated a preference for rural practice.

Altogether, we find (Part C, Table 87) that 46 per cent of the respondents preferred rural practice and 84 per cent anticipated that they would be engaged in group practice of some kind. Furthermore, none of the respondents anticipated a solo practice despite the fact that solo practice is still very much the normal type of practice in Pennsylvania among older physicians.

Reasons Given for Choices

Table 88 summarizes the reasons typically given by the respondents for choosing a given locale (rural, suburban, urban) or a given type of practice.

In general, the basis for their choice of locale was one or more of the following factors: good climate, good recreational facilities, safety of person or family, good schools, pleasant environment (trees, ocean, etc.), adequate to excellent cultural opportunities and activities, physician need of the area, adequacy of the population base for a practice to succeed, good hospital facilities, competent medical colleagues to associate with, the type of community (rural, suburban, etc.), nearby medical center for continuing education, preferences of wife and children, the openings available, near a medium-sized city, though prefer a semi-rural residence. Rural areas, of course, would have trouble meeting all of these requirements.

Those who chose a rural location gave these reasons: I like rural people; I prefer natural surroundings, their peace and tranquility; I was born and reared in a rural area; I am aware of the needs of rural residents for medical care; I wish to be near the ocean; I want a pleasant place to live in; I hate cities; no smog, more land available, more room, family likes rural setting, I like outdoor recreation (hunting, fishing, etc). Apparently, those who have been reared in a rural setting or who have experienced rural life prefer this locale, but there is evidence, also, of a disillusionment with cities and urban congestion on the part of the urban raised.

The urban location was chosen because: more facilities, in general, good transportation, quality of its medical centers, large teaching hospitals, spouse preferred urban life, constraints of the chosen specialty require a full-time position in research or in an urban hospital, more opportunities for practice in chosen specialty, practice in a large group practice setting is possible, greater variety of patients to treat, better medical facilities and good opportunities for continuing education. Apparently, the prime motives here are the requirements of a highly specialized hospital- and research-oriented medical specialty and the intellectual challenge of such a practice.

Table 87

An Analysis of Choice of Future Geographic Location and Type of Practice by Those Hershey 1971 Graduates Who Indicated a Preference One Year After Their Graduation

Proposed Area of Specialization	Desired Geographic Location			Anticipated Type of Practice		
	Rural	Suburbs	Urban	Solo	Group	Hospital
A. Basic Care Areas						
Family Practice	3	0	1	0	4	0
Internal Medicine	4	1	0	0	6	0
Pediatrics	0	0	2	0	1	1
General Surgery	1	0	0	0	0	0
Opthalmology	0	1	0	0	0	0
Eye, Nose, Throat	0	1	0	0	1	0
Total Basic Care	8	3	3	0	12	1
% Total	57%	21.5%	21.5%	0%	92%	8%
B. Medical Specialties Other Than Basic Care						
Neurology			1			1
Psychiatry	1		2		1	1
Gastro-Intestinal			1		1	
Anesthesiology	1				1	
Nuclear Medicine					1	
Clinical Research		1	1			
Total Non-Basic Care	2	1	5	0	4	2
% Total Non-Basic	25%	13%	62%	0%	67%	33%
C. All Hershey Respondents						
Basic Care	8	3	3	0	12	1
Other	2	1	5	0	4	2
Combined	10	4	8	0	16	3
% of Combined	46%	18%	36%	0%	84%	16%

Table 88

A Summary of Reasons Given By Some Respondents for Their Choice of Location and/or Practice

A. General Reasons for Choice of Location

1. Desirability of the geographic location
   - a. Climate
   - b. Recreation
   - c. Safety
   - d. Good Schools
   - e. Environment–trees, ocean, etc.
   - f. Cultural Opportunities
2. Need for physicians in an area, generally, i.e., adequate population base and availability of a position
3. *"Need of the population for good comprehensive medical care–a challenge to change the system"*
4. Good hospital facilities
5. Competent physicians to associate with
6. Type of community
7. Medical center for continuing education nearby
8. Wife and children's preference
9. Location is not important, offers are
10. Must be near a medium-size city (semi-rural setting)

B. Reasons Given for a Choice of Rural Location

1. *"Like rural people"*
2. Prefer natural surroundings (mountains, lakes, rivers, trees) and their peace and tranquility, i.e., good environment
3. Born and raised in rural area
4. Aware of needs of rural residents
5. Wish to be near ocean
6. More pleasant place to live
7. *"I hate cities"*
8. No smog
9. More land available, more room
10. Family likes rural setting.

11. Outdoor recreational interests

Table 88
(continued)

C. Reasons Given for a Choice of an Urban Location

1. More facilities generally
2. Good transportation
3. Medical centers of quality
4. Large teaching hospital
5. Spouse prefers urban life
6. Seeking full-time hospital, or academic medicine position
7. More opportunities for practice in my specialty
8. Large group practice possible
9. More medical challenges in variety of patients
10. Better medical facilities
11. Better for continuing education

D. Reasons Given for Choice of Suburban Location

1. Good hospital and other medical facilities
2. Dislike of cities
3. Medical center for continuing education nearby
4. Recreational, educational and cultural facilities tend to be good and readily available or nearby.
5. Type of community
6. Need for a community of colleagues
7. Academic positions available
8. Desirable patient population
9. Family and personal considerations

E. Reasons Given for a Choice of Group Practice

1. *"Medicine of the future will probably be provided by specialists in a group practice setting."* One man can't gain any more than a small amount of knowledge needed to treat the whole person
2. Group practice desirable
3. I anticipate group practice to be probable (i.e., typical of the future).

The reasons given for the suburban location are largely a mixture of the advantages of the rural and urban locale, i.e., good hospital and medical facilities, dislike of cities and love of a more natural setting, nearby medical center (urban) for continuing education, pleasant community life with amenities like country clubs, etc., a community of colleagues, academic positions available in nearby medical schools, desirable patient population, good schools, etc., for the family.

Obviously, those who choose a hospital setting do so out of career necessity considerations. The unanimous choice of group practice over solo practice as their anticipated type of practice is not so clear as to the reasons involved. Part E of Table 88 gives a summary of the kinds of reasons given for a group practice preference. Apparently, these young physicians see group practice as both desirable and as probably typical of future medical practice. They see the medicine of the future as based upon groups of specialists who provide the overall care that an individual physician once gave but can no longer give. This could possibly be seen as due to the incredible proliferation of medical knowledge and skills that no one man could master and, indeed, some respondents so indicated.

Although the respondents did not mention it and, indeed, they may not be aware of it, the available data on group versus solo practice indicate that, on the average, the net income of the physician is substantially higher in a group practice setting than for solo practice.[4] The higher net income seems to be due to the cost efficiencies inherent in group practice with its sharing of the cost of commonly utilized personnel and capital equipment, in addition to the use of auxiliary personnel to augment the productivity of the physicians involved.

These findings of a preference for group practice and a rural location by most physicians lend some hope that any effort by the state or federal government to institute a system of regional group practice centers in rural and other impacted areas, such as described in Chapter III, will result in ameliorating or even bring to an end the present plight of the rural and central city populations, since many of the objections to rural practice can be met by the use of such group practice settings (see Chapter III).

The answer, then, to the questions posed earlier about whether today's medical graduates would be acceptive of group practice and willing to enter basic care practice in a rural setting seems to be yes, depending, of course, upon the generalizability of Hershey Medical School survey findings for only one graduating class to the future graduating classes of all eight of the medical schools of Pennsylvania.

In summary then, we find that a maldistribution of physicians does, indeed, characterize Pennsylvania's medical picture with a great disparity between the counties existing in terms of the average age of their physicians and the number of people served by each physician, particularly basic care physicians. We also find, however, that the past tendency for physicians to prefer solo practice to group practice, an urban or suburban practice, to a rural practice and specialization to basic care may be changing to a pattern of preferring a group practice setting, preferably in a rural setting, along with a possible increased interest in basic care in the form of a specialization in family medicine.

It would seem possible, then, that despite current dissatisfactions and problems connected with solo rural practice,[5] the state may be able to develop a delivery alternative that will meet the expressed needs of physicians who are seeking a place of practice that offers collegiality, good medical facilities, less night call duty, etc.

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CHAPTER XIII

FINDINGS

The findings of this study may be summarized as follows:

Pennsylvania Ranking with Regard to Other States

1. Pennsylvania compares well with most other states.
    - a. It ranked 11th in population per physician in 1970.
    - b. It now has the most favorable population per physician ratio in this century, if not before.
2. Pennsylvania is a medical powerhouse with regard to its production of physicians producing more than its share population-wise.
    - a. Pennsylvania produced 9.6 per cent of all American trained graduates from 1950 to 1959 while its population ranged from 6 to 7 per cent of the total population of Continental U.S.A.
    - b. Only New York produced more physicians from 1950-59, 12.3 per cent of all graduates with 9.8 per cent of U.S. population.
3. During 1950-59, Pennsylvania ranked 25th among the states with regard to the number of graduates who were residents of the state in which trained at the time of enrollment.

Supply--Pennsylvania Residents vs. Out-of-State

1. Around 69 per cent of Pennsylvania's first year medical classes of the 1960s have been residents of the state.
2. During the 1960s, the percentage of state residents in the first year has varied widely from school-to-school, i.e., from 30.7 per cent and 39.4 per cent for the University of Pennsylvania and the Medical College of Pennsylvania, respectively, to 78.1 per cent, 74.5 per cent and 71.1 per cent for Temple, Jefferson and the University of Pittsburgh medical schools, respectively.
3. The percentage of Pennsylvania applicants accepted by the medical schools varies from 20.5 per cent for the Philadelphia College of Osteopathic Medicine to 2.8 per cent for the Pennsylvania State University Medical School at Hershey.
4. About 6.25 per cent of all applicants (institutional median) are being accepted but, again, the schools vary widely.
    - a. Applicants to Hahnemann, the University of Pennsylvania and Hershey Medical School find it harder to gain admission, 4.2 per cent, 5.6 per cent and 2.8 per cent of all applicants, respectively.
    - b. Jefferson and Temple are about average for the state at around 6 per cent, while applicants to the Medical College of Pennsylvania, The University of Pittsburgh and the Philadelphia College of Osteopathic Medicine find admission to be relatively easier, 9.1 per cent, 6.7 per cent and 20.5 per cent acceptances, respectively.
5. Pennsylvania applicants find it much easier to be accepted than do out-of-state applicants, i.e., 11.7 per cent of Pennsylvanians are accepted to 6.2 per cent of out-of-state applicants, not counting those for the Philadelphia College of Osteopathic Medicine for whom data were not available.
6. There has been a steady drop in the proportion of Pennsylvania residents applying for admission to the medical schools of Pennsylvania.
    - a. Hershey in 1971-72 had the highest proportion of Pennsylvania applicants (44.3 per cent) although only 2.8 per cent were accepted into the first year class.
    - b. The University of Pennsylvania, on the other hand, had the lowest (22.8 per cent) proportion of Pennsylvania applicants.

7. The proportion of female applicants has been rising rapidly (22.5 per cent per year) in all institutions with the sole exception of Hahnemann where the male rise exceeds the female rise in applicants, i.e., males 26.8 per cent per year, females 7.8 per cent per year.

8. Overall, 6 per cent of female applicants and 6 per cent of male applicants are accepted, but Jefferson (9.6 per cent), the University of Pennsylvania (6.6 per cent) and the Medical College of Pennsylvania (8.3 per cent) give females more acceptances proportionately.

Supply--Pennsylvania's Holding Power and In-migration

1. As of 1967, the proportion of our graduates (1950-59) remaining in Pennsylvania as practitioners of medicine was 41 per cent, but as of 1971, this figure had dropped to 35 per cent (1961-63 graduates).

    a. Pennsylvania ranked 17th in terms of its holding power (41 per cent) for the 1950-59 graduates, and the state ranking for the 1961-73 graduates is not yet available.

    b. Five of our medical schools, 1961-63, had a comparable holding power which averaged around 40 per cent or better but this average was lowered to 35 per cent statewide by Jefferson Medical School (36 per cent), the University of Pennsylvania Medical School (29 per cent) and the Medical College of Pennsylvania (19.5 per cent).

    c. The low state holding power of the Medical College of Pennsylvania may be explained partly on the basis that only 45 per cent of female graduates actually enter practice and, if this were not true, the holding power of the Medical College of Pennsylvania might be nearer 43 per cent.

2. In comparison to other states, Pennsylvania ranked 5.5 in the percentage of 1950-59 out-of-state trained graduates who entered Pennsylvania to practice, i.e., 2.1 per cent of all graduates trained in other states.

    a. Only California (10 per cent), New York (3.7 per cent), Florida (3.4 per cent), New Jersey (2.8 per cent) and Texas (2.4 per cent) attracted more.

    b. Pennsylvania has, therefore, been highly competitive in attracting physicians.

3. One of every six Pennsylvania physicians in 1971 was trained in a foreign medical school (identical to that for the United States as a whole.)

4. Around 20 per cent of all new Pennsylvania physicians during the 1960s were foreign trained.

5. Pennsylvania held, in 1971, the following proportions of its 1961-63 graduates (holding power): 8 per cent in general or family medicine, 4 per cent in internal medicine, 2 per cent in pediatrics, 2 per cent in general surgery, 19 per cent in other specialties or 35 per cent in all.

6. Of all U.S. graduates, 0.005 per cent, 1961-63, became family medicine practitioners in Pennsylvania, 0.29 per cent became general practitioners, 0.27 per cent became internists, 0.13 per cent became pediatricians, 0.09 per cent became general surgeons and 1.08 per cent became practitioners of other specialties. In sum, 1.865 per cent of the U.S. graduates became practitioners in Pennsylvania.

7. Of all Pennsylvania medical doctors, 82.92 per cent were trained in the United States.

8. Of all Pennsylvania medical doctors, 58.31 per cent were trained in Pennsylvania.

9. Of all Pennsylvania medical doctors, 24.61 per cent were trained in another state.

10. Of all Pennsylvania medical doctors, 17.01 per cent were trained outside of the United States as follows:

    a. 4.96 per cent were trained in Europe (29.02 per cent of all foreign-trained medical doctors in Pennsylvania)

b. 6.69 per cent were trained in an Asiatic country (39.18 per cent of all foreign-trained medical doctors in Pennsylvania)

c. 2.14 per cent were trained in South America (12.56 per cent of all foreign trained in Pennsylvania)

d. 1.81 per cent were trained in the Middle East (10.58 per cent of all foreign trained in Pennsylvania)

e. 1.20 per cent were trained in Canada (7.01 per cent of all foreign trained in Pennsylvania)

f. 0.12 per cent were trained in Australia or New Zealand (0.7 per cent of all foreign trained in Pennsylvania)

g. 0.09 per cent were trained in South Africa (0.52 per cent of all foreign trained in Pennsylvania)

11. Pennsylvania's holding power pattern for its osteopathic graduates differs markedly from that of its medical doctor graduates.

Specialty	M.D.	D.O.	Combined
General Practice	6%	30%	8%
Family Medicine	1%	-	-
Internal Medicine	4%	1%	4%
Pediatrics	2%	1%	2%
General Surgery	2%	2%	2%
Other Specialties	20%	8%	19%
Total	34%	42%	35%

Projected Growth in Supply

1. The output of Pennsylvania's medical schools in terms of graduates should rise by 78 per cent over the 1970 figure of 752 with Hershey, Hahnemann and the Philadelphia College of Osteopathic Medicine projecting the most growth, i.e., 167 per cent, 147 per cent and 191 per cent, respectively. Projected output of graduates by 1980 will be 1,340 per year (Table 4).

2. Between 1971 and 1980, it is projected (Table 22a) that 8,793 active physicians will enter practice in Pennsylvania beyond the residency level of practice.

The projections for each area of practice account for about 7,700 direct care physicians (Table 22a); with approximately 1,896 in general family practice, 864 in internal medicine, 556 in pediatrics, 925 in general surgery and 3,543 in other specialties.

Projecting the separate areas contained in general estimate of total direct care physicians because of rounding percentages and particularly the other specialties category produce some discrepancy in totals for direct care.

Medical School Enrollment Growth

1. Interest in medicine as a career is on the increase, 4.8 per cent of college freshmen indicated such plans in 1966 but 5.5 per cent had done so in 1972.

2. Increased interest in medicine is likely since medicine is now the highest paid of the professions and professional unemployment in other areas has been higher than in the past. For example: Physicians netted a median income, after expenses but before taxes, of $22,100 in 1959. This rose to $40,550 in 1969 and a linear projection would raise this to around $63,580 by 1980, assuming a three-year freeze of income during 1971-74. Much of this increase will be due to inflation.

3. Our Pennsylvania medical schools' first year enrollments grew at a rate of 1.9 per cent per annum while the applications grew at a 22.52 per cent annum rate which also suggests increasing interest in medicine as a career.

Characteristics of Pennsylvania Medical Students

1. Over the decade of the 1960s, some Pennsylvania medical schools have increased their proportion of Pennsylvania residents in their first year classes, notably the Medical College of Pennsylvania, with an increase from 33.3 per cent in 1960-61 to 60.6 per cent in 1971-72.

2. There are, however, expectations. The University of Pennsylvania dropped from 56 per cent to 47.5 per cent, the University of Pittsburgh dropped from 81 per cent to 72 per cent and the Philadelphia College of

Osteopathic Medicine dropped from 77.5 per cent to 64 per cent.

3. Of all Pennsylvania medical students, 0.7 per cent are foreign students.

4. Of the medical students in the state-related medical schools, 77.2 per cent are Pennsylvania residents while only 58.7 per cent of the students in the state-aided medical schools are residents of Pennsylvania.

5. In 1971-71, 63.1 per cent of the 1971-72 graduating class were residents.

Medical School Applicant and Acceptance Patterns

1. Pennsylvania ranked third, behind California and New York, in the number of accepted applicants and ranks second in the number of applicants to U.S. medical schools.

2. In contrast, Pennsylvania ranks 40th in the percentage (39.5 per cent) of its applicants who were accepted even though the applicants ranked 10th in the number of applications made.

3. California, however, is even lower with only 35.2 per cent of its applicants accepted, but New York does better than Pennsylvania since 43 per cent of its applicants are accepted.

4. Pennsylvania's female applicants do somewhat better in the proportion of acceptances with a rank of 30 among the states.

5. Nationally, and in Pennsylvania, the mean medical college aptitude test scores for successful applicants and, to a lesser degree, unsuccessful applicants are constantly rising indicating increasing selectivity for verbal intelligence and scientific and mathematical aptitude.

6. This latter finding suggests that some rural and inner-city students with a lower quality educational background are being excluded even though they might be more inclined to practice in a rural or in inner-city area where the need for physicians is likely to be acute.

Physician Growth

1. The future growth of physicians, often unpredicatable, is likely to be determined by the following factors:

    a. Increase in population, especially in the aged.

    b. Rising health consciousness of public resulting in increased demand for services.

    c. Higher standards of health care than those now current.

    d. Probable expansion of prepaid group medical care.

    e. Continued or increased care for members of the Armed Forces, their families and for veterans.

    f. Continued growth in public health, rehabilitation, industrial medicine and mental health programs and facilities.

    g. Increased need for research personnel and medical school faculty as we seek to develop biomedical medicine or find the basic causes of diseases such as cancer, arteriosclerosis, hypertension and osteoarthritis as well as redress the physician shortage problem.

2. By 1980 Pennsylvania is projected to have somewhere between 23,850 and 26,510 physicians with 25,900 as the official projection arrived at in this study.

3. The number of general practitioners will continue to decline until about 1977 when they they will start to increase in numbers largely due to the impact of growth in the output of osteopathic physicians.

4. The growth of and impact of the new specialty of family medicine is not now ascertainable but may well supplant general practice or the primary area of medicine.

5. Currently, however, specialists in family medicine in Pennsylvania (102) are largely practicing in major urbanized regions of the state.

6. Pennsylvania has only 3.1 per cent of the family medicine practitioners in the country although Pennsylvania has around 4.5 per cent of the U.S. population.

7. Hershey Medical School (Penn State) graduated 33 students in 1971, but only 4 of the 33 (12 per cent) have since entered the specialty of family medicine despite the emphasis upon this area at Hershey.

8. If the preceding 12 per cent figure was true of all of Pennsylvania medical schools rather than the 8 per cent rate of the 1960s for general practice, then accessibility to family medicine would rapidly increase.

9. Approximate physician totals (M.D. and D.O.) by 1980 (Table 35) are projected as: (a) total active practice physicians, 19,772 and (b) direct patient care physicians, 17,264. Areas of direct patient care are projected as: general and family practice, 3,893; internal medicine, 1,809; pediatrics, 1,025; general surgery, 1,635 and other specialties, 9,013, for a total of 17,375. This is a discrepancy of 111 over the total direct care projections, about 11 physicians per year, which may be explained by rounding of percentages.

Need Over and Above Projected Growth

1. Ideally, Pennsylvania, by 1980, should have 6,085 direct patient care general or family medicine specialists rather than 3,893; 2,434 internists rather than 1,809; 1,217 pediatricians rather than 1,025 and 1,217 general surgeons rather than 1,635.

2. General surgeons will definitely be a surplus specialty by 1980.

3. A large unmet need for general practitioners and internists (basic care) is expected to remain a problem in 1980 and, in fact, the situation could be worse than in 1971.

4. In effect the state by 1980 will be short 2,200 general practitioners and 625 internists. At the same time a surplus could occur of some 400 general surgeons and around 1,000 other specialists.

5. Gastroenterology, pulmonary disease, radiology, thoracic surgery, urology and pathology should be adequately covered, while cardiology, neurology, neurosurgery, obstetrics and gynecology, opthalmology, orthopedics and psychiatry are likely to be in a surplus state by 1980.

6. The need areas for 1980 are expected to be (in addition to general/family practice, internal medicine and pediatrics) allergy, anesthesiology, colon and rectal surgery, dermotology, otolaryngology and plastic surgery.

Possible Impact of Prepaid Group Medical Care

1. Prepaid plans may become more commonplace and result in a changing need picture.

2. The prepaid group plans use general practitioners and internalists interchangeably at a more efficient ratio of 2,441 people per physicians as compared with an optimum ratio of 1,429 people per physicians for the conventional delivery system, that is, 1,012 more people for each physician.

3. Prepaid group plans use fewer general surgeons since they have a ratio of 17,117 people per surgeon as compared with the conventional delivery system's optimum ratio of 10,000 people per surgeon, i.e., 7,727 more people per physician.

4. The lower need for surgeons is probably due to efforts to reduce unnecessary surgery and increase preventative care.

5. Prepaid group plans use more pediatricians than are considered optimum in the conventional delivery system or 3,952 fewer people.

6. A shift toward prepaid plans might, therefore, increase our need for pediatricians but it might also decrease our need for the other types of specialty.

Physician Mortality

1. Pennsylvania will need approximately 2,000 active practice physicians between 1971 and 1980 to replace those who die.

2. Pennsylvania will need approximately:

   a. 739 general practitioners between 1971 and 1980 or 84 per year on the average.

   b. 177 internists between 1971 and 1980 or 20 per year.

   c. 68 pediatricians between 1971 and 1980 or 8 per year.

   d. 153 general surgeons between 1971 and 1980 or 17 per year.

   e. 830 other specialists between 1971 and 1980 or 92 per year.

Physician Disability and Retirement

1. On the average, about six general practitioners per year will become disabled for a lengthy period of time along with 3 internists, 2 pediatricians, 3 general surgeons, 17 specialists in other areas and 5 in other than patient care activities.

2. Thirty-five active physicians including 30 direct patient care physicians will be required to replace disabled physicians.

3. Physicians now retire around 72 years of age although some continue to practice into their 90's.

4. Retirement probably will come earlier in the 1970s and 1980s due to a higher income level with expectations of the good life, increasing costs of maintaining a part-time practice as one ages, increasing paper work, increasing influence of the leisure-oriented society of today and decreased feelings of being sorely needed as the physician ratios near the optimum levels for our delivery system.

5. On the average, 438 active physicians will retire each year. Retirees per year in direct patient care will include approximately 80 in general practice, 23 internists, 6 pediatricians, 9 general surgeons, 100 in other specialties and 28 in other than patient care.

Migration

1. On the average, Pennsylvania will lose about 540 actively practicing (beyond the residency) physicians a year but will gain around 700 per year for an overall net gain of about 160 per year.

2. All of the specialties show this trend of net gain with the exception of pediatrics which was found to have a net gain of zero.

Projections of Total Need

1. It is projected that between 1971 and 1980 Pennsylvania will require between 5,670 and 7,380 more physicians than the supply will provide. Each year we will have to produce or import 630 to 820 more physicians over and above the projected supply in order to meet our minimal needs or make our medical care closer to the optimum.

2. The largest need will be for general practitioners with up to 260 more per year being required, i.e., up to 2,340 more between 1971 and 1980 than produced or imported.

3. Approximately 50 to 120 more internists per year will be needed,i.e., some 450 to more internists between 1971 and 1980.

4. Approximately 40 to 60 pediatricians per year will be needed, around 360 to 540 more from 1971 to 1980.

5. Need for general surgeons cannot actually be said to exist beyond those Pennsylvania produces and imports.

6. On the average, Pennsylvania will need to produce or import around 330 more specialists per year in other areas; 2,970 more between 1971 and 1980.

7. Our needs would be even greater if the supply of foreign physicians were to slacken.

Implications for Pennsylvania's Medical Schools

1. The number of students could be increased by 2.5 to 3 times the projected class size. This assumes that practice in Pennsylvania will not be any more attractive to out-of-state and foreign-trained physicians or to our own graduates than during the 1960s.

2. Emphasis on less costly solutions is likely to be more fruitful since a large increase in class size is more likely to result in a surplus of specialists who will leave the state.

3. Strong incentives to remain in Pennsylvania should be sought. Also, appropriate training, legislative and other actions should be taken to further the use of paramedical personnel. Other means should be devised to make physicians more productive especially group practice designed to meet rural patient needs.

4. Medical schools should consider putting an emphasis on basic care (family medicine), on research in rural and urban delivery system alternatives, on research and training in the effective use of physicians assistants and other paraprofessionals and on the sociology of medicine in their curriculum and research efforts.

The Physician Maldistribution Problem

1. The various regions and counties of the state vary widely in median age from 64.5 years in Sullivan County to 37.4 years in Montour County compared to 46 years for the entire state and nation.

2. Seven of the Pennsylvania counties are projected to lose one-half or more of their physicians by 1980, due to death or retirement. The counties are: Adams, Cameron, Clarion, Pike, Sullivan, Wayne and Wyoming.

3. Twelve more counties may lose 25 to 49 per cent of their physicians by 1980. They are: Bedford, Butler, Carbon, Crawford, Fayette, Franklin, Indiana, Jefferson, Lackawanna, Luzerne, Northumberland and Schuylkill.

4. Forty-five out of 67 counties have enough basic care physicians (G.P., F.M., I.M., G.S.) to reach or exceed 50 per cent of the optimum number for those counties (see Table 84).

5. Seventeen counties have 70 per cent or more of the optimum number of basic care physicians with the top 10 having 75 per cent or more or the optimum number of basic care physicians (see Table 84).

6. Twenty-two counties on the other hand have less than 50 per cent of the number regarded as optimum and this goes down to 40 per cent of the optimum for Pike and Sullivan counties (see Table 84).

7. The median percentage of optimum for the counties is 58 per cent while the percentage figure for Pennsylvania is 70 per cent.

8. Fifty of the 67 counties are below the state median and 35 are below the county median.

9. Maldistribution by specialty and by geographic area with its consequent physician-age maldistribution is Pennsylvania's basic problem and is not subject to the simple solutions of producing more physicians.

Hope for the Future

1. Data from a survey of Hershey Medical School graduates of 1971 lends some credence to the possibility that young physicians may be more willing to enter basic care in rural or urban areas of need and may be more willing to enter into group practice rather than solo practice.

2. The Hershey graduates unanimously chose group or hospital practice over solo practice.

3. Twelve per cent of the graduates chose family medicine as a specialty, more than chose it one year before at their graduation.

4. Rural practice may continue to be frequently rejected. Graduates indicated that they

selected the location of practice on the basis of the following considerations, many of which are difficult for a rural area to meet: climate, good recreational facilities, safety of family or person, quality of the schools, pleasant environment (trees, ocean, etc.), cultural opportunities, physician needs of area, adequacy of the population base for practice, good hospital facilities, type of community (rural, urban, etc.), medical center for continuing education nearby, preferences of wife and children, availability of openings and a medium-sized city nearby if rural location.

5. Those who did indicate preference for rural practice gave the following reasons: Liking for rural people, preference for natural surroundings, sense of peace and tranquility, born and raised in rural area, awareness of rural needs, hatred of cities, avoidance of smog, crime, more land available, more room in rural area, family prefers rural life and love of outdoor recreation such as hunting and fishing.

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APPENDICES

Appendix A

Historical Data Based Linear Projections of Growth in the Medical Specialties Using AMA Data Corrected for the 1968 Change in Classification or Data from the American Osteopathic Association

Table 1.a.

Projections of Growth for Physicians (M.D.) in Administration
(r = 0.9220, Regression Equation = 12.6789 x -24,366.7713)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimates	Error
1963	146	3.5625	520	522	0.00
1964	151	3.5625	538	535	-0.01
1965	149	3.5625	531	547	0.03
1966	160	3.5625	570	560	-0.02
1967	166	3.5625	591	573	-0.03
1968	570	1.0000	570	585	0.03
1969	610	1.0000	610	598	-0.02
1970	601	1.0000	601	611	0.02
			Projected Totals		
1971			623		
1972			636		
1973			649		
1974			661		
1975			674		
1976			687		
1977			699		
1978			712		
1979			725		
1980			737		

Appendix A-Contd.

Table 2.a.

Projections of Growth for Direct Patient Care M.D.'s in Aerospace Medicine (Median Incidence of 3 Used to Project to 1980)

Year	Uncorrected Totals	Correction Factor	Corrected Totals
1963	4	1.6667	7
1964	2	1.6667	3
1965	2	1.6667	3
1966	2	1.6667	3
1967	3	1.6667	5
1968	5	1.0000	5
1969	3	1.0000	3
1970	2	1.0000	2
			Projected Totals[a]
1971			3
1972			3
1973			3
1974			3
1975			3
1976			3
1977			3
1978			3
1979			3
1980			3

---

[a] A linear regression based projection would have gone to a value of 3 in 1971, 2 in 1972, 1 in 1975 and 0 in 1978. This did not seem reasonable so the median value of the historical data (3) was used instead.

Appendix A-Contd.

Table 3.a.

Projections of Growth for Direct Patient care M.D.'s in the Specialty of Allergic Diseases (r = 0.9435, Regression Equation = 2.6667 x -5,134.7467)

Year	Uncorrected Totals[a]	Correction Factor[b]	Corrected Totals	Regression Estimate	Error
1963	52 3	1.6441 6.0000	85 18 (103)	100	-0.03
1964	50 3	1.6441 6.0000	82 18 (100)	103	0.03
1965	52 3	1.6441 6.0000	85 18 (103)	105	0.02
1966	55 3	1.6441 6.0000	90 18 (108)	108	0.00
1967	57 3	1.6441 6.0000	94 18 (112)	111	-0.01
1968	97 18	1.0000 1.0000	97 18 (115)	113	-0.02
1969	99 14	1.0000 1.0000	99 14 (113)	116	0.03
1970	105 15	1.0000 1.0000	105 15 (120)	119	-0.01

	Projected Totals[c]
1971	121
1972	124
1973	127
1974	129
1975	132
1976	135
1977	137
1978	140
1979	143
1980	146

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[a] Second figure for each year represents the total for Pediatric allergy.

[b] Upper figure represents "allergy total" correction factor and lower figure represents the "Pediatric allergy" correction factor.

[c] Projections based upon total of the allergy and Pediatric allergy figures during 1963-70.

Appendix A-Contd.

Table 4.a.

Projections of Growth for Direct Patient Care M.D.'s in Anesthesiology
(r = 0.9931, Regression Equation = 12.7024 x -24,655.8553)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	262	0.9785	256	259	0.01
1964	283	0.9785	277	272	-0.02
1965	291	0.9785	285	284	0.00
1966	302	0.9785	296	297	0.00
1967	317	0.9785	310	310	0.00
1968	318	1.0000	318	322	0.01
1969	332	1.0000	332	335	0.01
1970	353	1.0000	353	348	-0.01
			Projected Totals		
1971			361		
1972			373		
1973			386		
1974			399		
1975			411		
1976			424		
1977			437		
1978			450		
1979			462		
1980			475		

Appendix A-Contd.

Table 5.a.

Projections of Growth for Direct Patient Care M.D.'s in Cardiology and Pediatric Cardiology (r = 0.9999, Regression Equation = 14.1125 x -27,475.0526 for Years 1964, 1969-70)

Year	Uncorrected Totals[a]	Correction Factor[b]	Corrected Totals	Regression Estimate	Error
1963	103 3	2.4248 2.2500	250 7 (257)	*	*
1964	97 3	2.4248 2.2500	235 7 (242)	242	0.00
1965	98 4	2.4248 2.2500	238 9 (247)	*	*
1966	100 3	2.4248 2.2500	243 7 (250)	*	*
1967	107 4	2.4248 2.2500	259 9 (268)	*	*
1968	274 9	1.0000 1.0000	274 9 (283)	*	*
1969	301 11	1.0000 1.0000	301 11 (312)	313	0.00
1970	314 13	1.0000 1.0000	314 13 (327)	327	0.00

Year	Projected Totals[c]
1971	341
1972	355
1973	369
1974	383
1975	397
1976	411
1977	425
1978	440
1979	454
1980	468

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*Indicates data not used in computing regression equation.

[a] Upper figure represents Cardiology total, lower figure represents Pediatric Cardiology total.

[b] Upper figure represents correction factor for Cardiology and the lower figure, Pediatric Cardiology.

[c] Data points chosen for the regression were based upon a graphic analysis of the growth curve.

Appendix A-Contd.

Table 6.a.

Projections of Growth for Direct Patient Care M.D.'s in the Specialty of Colon and Rectal Surgery (r = -0.8226, Regression Equation = -0.8691 x +1,760.1689)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	54	1.0000	54	54	0.00
1964	54	1.0000	54	53	-0.02
1965	54	1.0000	54	52	-0.04
1966	51	1.0000	51	52	0.02
1967	48	1.0000	48	51	0.06
1968	50	1.0000	50	50	0.00
1969	48	1.0000	48	49	0.02
1970	50	1.0000	50	48	-0.04
			Projected Totals[a]		
1971			47		
1972			46		
1973			46		
1974			44		
1975			44		
1976			43		
1977			42		
1978			41		
1979			40		
1980			39		

---

[a] A possible alternative projection would be to assume that the figure would continue to hover between 40 and 50, i.e., a projection of 49 through 1980 based on the static pattern of 1967=70. However, the decrement projected here could possibly reflect an increasing use of chemotherapy as an alternative to surgery or a lessening of the incidence of colon and rectal diseases.

Appendix A - Continued

TABLE 6a

Projections of Growth for Direct Patient Care M.D.'s in the Specialty of Colon and Rectal Surgery (r = -0.8226, Regression Equation = -.0.8691 x +1,760.1689)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	54	1.0000	54	54	0.00
1964	54	1.0000	54	53	-0.02
1965	54	1.0000	54	52	-0.04
1966	51	1.0000	51	52	0.02
1967	48	1.0000	48	51	0.06
1968	50	1.0000	50	50	0.00
1969	48	1.0000	48	49	0.02
1970	50	1.0000	50	48	-0.04
			Projected Totals[a]		
1971			47		
1972			46		
1973			46		
1974			44		
1975			44		
1976			43		
1977			42		
1978			41		
1979			40		
1980			39		

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[a] A possible alternative projection would be to assume that the figure would continue to hover between 48 and 50, i.e., a projection of 49 through 1980 based on the static pattern of 1967-70. However, the decrement projected here could possibly reflect an increasing use of chemotherapy as an alternative to surgery or a lessening of the incidence of colon and rectal diseases.

Appendix A-Contd.

Table 7.a.

Projections of Growth for Direct Patient Care M.D.'s in Dermatology (3 Per Cent Rise Estimate, Based upon Projected Pennsylvania Population Growth)

Year	Uncorrected Totals	Correction Factor	Corrected Totals
1963	161	0.9188	148
1964	165	0.9188	152
1965	158	0.9188	145
1966	156	0.9188	143
1967	159	0.9188	146
1968	147	1.0000	147
1969	145	1.0000	145
1970	149	1.0000	149
	Projected Totals		
1971	149		
1972	149		
1973	150		
1974	150		
1975	151		
1976	151		
1977	152		
1978	152		
1979	153		
1980	153		

Appendix A-Contd.

Table 8.a.

Projections of Growth for Direct Patient Care M.D.'s in Gastroenterology
(r = 0.9895, Regression Equation = 4.4645 x -8,716.2218)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	27	1.8158	49	48	-0.02
1964	28	1.8158	51	52	0.02
1965	32	1.8158	58	56	-0.03
1966	32	1.8158	58	61	0.05
1967	36	1.8158	65	65	0.00
1968	69	1.0000	69	70	0.01
1969	76	1.0000	76	74	-0.03
1970	79	1.0000	79	79	0.00
			Projected Totals		
1971			83		
1972			88		
1973			92		
1974			97		
1975			101		
1976			106		
1977			110		
1978			115		
1979			119		
1980			123		

Appendix A-Contd.

Table 9.a.

Projections of Growth for Direct Patient Care M.D.'s in General Surgery ($r = 1.0000$, Regression Equation = $29.3578 x -56{,}791.0171$ for Years 1967, 1968 and 1970)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	1,018	0.8971	913	*	*
1964	1,045	0.8971	937	*	*
1965	1,054	0.8971	946	*	*
1966	1,068	0.8971	958	*	*
1967	1,066	0.8971	956	956	0.00
1968	985	1.0000	985	985	0.00
1969	980	1.0000	980	*	*
1970	1,044	1.0000	1,044	1,044(1,008)	0.00
			Projected Totals		
1971			1,073(1,020)		
1972			1,103(1,033)		
1973			1,132(1,045)		
1974			1,161(1,057)		
1975			1,191(1,069)		
1976			1,220(1,081)		
1977			1,249(1,093)		
1978			1,279(1,106)		
1979			1,308(1,118)		
1980			1,337(1,130)		

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*Indicates those years not used in the determination of future trend. Alternately, (1) the years 1964, 1965, 1966 and 1968 could have been used or (2) the mean of both projections. The regression equation for these alternative years is $12.1714 x -22{,}969.4826$, $r = 0.9966$ and the projected alternative totals are shown in parenthesis along with the 1970 alternative total of 1,008. This was rejected in favor of the more recent trend pattern for 1967-68 and 1970.

Appendix A-Contd.

Table 10.a.

Projections of Growth for Direct Patient Care M.D.'s in General Practice (r = 0.9917, Regression Equation = -88.7023 + 178,020.1674)

Year	Uncorrected Totals	Correction Factor[a]	Corrected Totals[b]	Regression Estimate	Error
1963	4,579	0.8536	3,909	3,898	-0.05
1964	4,443	0.8536	3,793	3,809	0.04
1965	4,328	0.8536	3,694	3,720	0.01
1966	4,265	0.8536	3,641	3,631	0.00
1967	4,188	0.8536	3,575	3,543	0.00
1968	3,487	1.0000	3,487	3,454	-0.01
1969	3,318	1.0000	3,318	3,365	0.01
1970	3,282	1.0000	3,282	3,277	0.00
			Projected Totals		
1971			3,188		
1972			3,099		
1973			3,011		
1974			2,922		
1975			2,833		
1976			2,744		
1977			2,656		
1978			2,567		
1979			2,478		
1980			2,390		

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[a] All correction factors in this appendix are based upon the ratio of the old pre-1968 classification schema to the near classification schema using 1968 data as found in the AMA publication.

[b] The corrected totals in this appendix represent an estimate only since we cannot be certain that the percentage change in the 1968 data due to reclassification would have been precisely the same for all prior years.

Appendix A-Contd.

Table 11.a.

Projections of Growth for Direct Patient Care M.D.'s in the Specialty of Internal Medicine (r = 0.9947, Regression Equation = 24.2642 x -46,489.6537 for Years 1964, 1965, 1967, 1968 and 1970)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	1,311	0.8535	1,119	*	*
1964	1,366	0.8535	1,166	1,165	-0.01
1965	1,395	0.8535	1,191	1,189	0.00
1966	1,509	0.8535	1,288	*	*
1967	1,440	0.8535	1,229	1,238	0.01
1968	1,270	1.0000	1,270	1,262	-0.01
1969	1,223	1.0000	1,223	*	*
1970	1,310	1.0000	1,310	1,311	0.00
			Projected Totals		
1971			1,335		
1972			1,359		
1973			1,384		
1974			1,408		
1975			1,432		
1976			1,456		
1977			1,481		
1978			1,505		
1979			1,529		
1980			1,553		

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* Indicates that the corrected total for that year was considered anomalous and was not used in deriving the regression equation.

Appendix A-Contd.

Table 12.a.

Projections of the Number of Inactive M.D.'s During the 1970s (r = -0.9489, Regression Equation = -34.4763 x +68,912.5668)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	680	1.8213	1,238	1,236	0.00
1964	665	1.8213	1,211	1,201	-0.01
1965	641	1.8213	1,167	1,167	0.00
1966	618	1.8213	1,126	1,132	0.01
1967	603	1.8213	1,098	1,098	0.00
1968	1,009	1.0000	1,009	1,063	0.05
1969	1,078	1.0000	1,078	1,029	-0.05
1970	991	1.0000	991	994	0.00
			Projected Totals		
1971			960		
1972			925		
1973			891		
1974			856		
1975			822		
1976			787		
1977			753		
1978			718		
1979			684		
1980			649		

Appendix A-Contd.

Table 13.a.

Projections of Growth for Pennsylvania Interns in the 1970s Based Upon the 1960s (r = 0.5979, Regression Equation = 9.8801 x -18,677.7293)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	688	1.0219	703	717	0.02
1964	719	1.0219	735	727	-0.01
1965	697	1.0219	712	737	0.04
1966	749	1.0219	765	747	-0.02
1967	741	1.0219	757	756	0.00
1968	792	1.0000	792	766	-0.03
1969	821	1.0000	821	776	-0.05
1970	727	1.0000	727	786	0.08
			Projected Totals[a]		
1971			796		
1972			806		
1973			816		
1974			826		
1975			835		
1976			845		
1977			855		
1978			865		
1979			875		
1980			885		

[a] These projections are undoubtedly likely to be very conservative when compared to the actual figures in the 1970s but they do represent what the situation would be if we did not take steps to encourage our graduates to intern here and, if necessary, expand the programs. It is true, however, that internship may be on the way out and, if so, these figures may even be too high.

Appendix A - Contd.

TABLE 13.a.

Projections of Growth for Pennsylvania Interns in the 197s Based Upon the 1960s (r = 0.5979, Regression Equation = 9.8801 x -18,677.7293)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	688	1.0219	703	717	0.02
1964	719	1.0219	735	727	-0.01
1965	697	1.0219	712	737	0.04
1966	749	1.0219	765	747	-0.02
1967	741	1.0219	757	756	0.00
1968	792	1.0000	792	766	-0.03
1969	821	1.0000	821	776	-0.05
1970	727	1.0000	727	786	0.08

	Projected Totals[a]
1971	796
1972	806
1973	816
1974	826
1975	835
1976	845
1977	855
1978	865
1979	875
1980	885

---

[a] These projections are undoubtedly likely to be very conservative when compared to the actual figures in the 1970s,but they do represent what the situation would be if we did not take steps to encourage our graduates to intern here and, if necessary, expand the programs. It is true, however, that internship may be on the way out and, if so, these figures may even be too high.

Appendix A - Contd.

Table 14.a.

Projections of Growth for Physicians (M.D.) in Medical Teaching
(r = 0.9375, Regression Equation = 15.9289 x -31,045.1855)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	515	0.4077	210	223	0.06
1964	554	0.4077	226	229	0.01
1965	654	0.4077	267	255	-0.04
1966	697	0.4077	284	271	-0.05
1967	758	0.4077	309	286	-0.07
1968	307	1.0000	307	303	-0.01
1969	305	1.0000	305	319	0.05
1970	324	1.0000	324	335	0.03
			Projected Totals		
1971			351		
1972			367		
1973			383		
1974			398		
1975			414		
1976			430		
1977			446		
1978			462		
1979			478		
1980			494		

Appendix A - Contd.

Table 15.a

Projections of Growth for Direct Patient Care M.D.'s in Neurology
(r = 0.9610, Regression Equation = 6.5 x -12,722 for Years 1967-70)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	61	1.0000	61	*	*
1964	58	1.0000	58	*	*
1965	62	1.0000	62	*	*
1966	67	1.0000	67	*	*
1967	63	1.0000	63	64	0.02
1968	69	1.0000	69	70	0.01
1969	80	1.0000	80	77	-0.04
1970	81	1.0000	81	83	0.03
			Projected Totals		
1971			90		
1972			96		
1973			103		
1974			109		
1975			116		
1976			122		
1977			129		
1978			135		
1979			142		
1980			148		

*Data not used for regression estimate.

Appendix A - Contd.

Table 16.a.

Projections of Growth for Direct Patient Care M.D.'s in Neurosurgery (r = 0.8239, Regression Equation = 2.2738 x -4,400.8165 for Years 1963-70 and r = 0.9253, Regression Equation = 5 x -9,767.5 for Years 1967-70)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	1963-70 Regression Estimate	Error	1967-70 Regression Estimate	Error
1963	64	1.0000	64	63	-0.02	*	*
1964	68	1.0000	68	65	-0.04	*	*
1965	69	1.0000	69	67	-0.03	*	*
1966	64	1.0000	64	70	0.09	*	*
1967	69	1.0000	69	72	0.04	68	-0.01
1968	72	1.0000	72	74	0.03	73	0.01
1969	74	1.0000	74	76	0.03	78	0.05
1970	85	1.0000	85	79	-0.07	83	-0.02

	Projected Totals		
	1963-70	1967-70	Weighted Mean[a]
1971	81	88	86
1972	83	93	90
1973	85	98	94
1974	88	103	98
1975	90	108	102
1976	92	113	106
1977	95	118	110
1978	97	123	114
1979	99	128	118
1980	101	133	122

*Indicates data not used in computation of the regression equation.

[a] 1963-70 projections given a weight of one and the 1967-70 projections a weight of two, e.g., 81 + 88 + 88 ÷ 3 = 86.

Appendix A-Contd.

Table 17.a.

Projections of Growth for Direct Patient Care M.D.'s in Obstetrics and Gynecology (r = 0.9975, Regression Equation = 10.871 x -20,607.53 for Years 1963, 1965-69 and r = 1.00, Regression Equation = 42 x -81,899 for 1969-70)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	1963,1965-69 Regression Estimates	Error	1969-70 Regression Estimate	Error
1963	814	0.9016	734	732	0.00	*	*
1964	835	0.9016	753	*	*	*	*
1965	836	0.9016	754	754	0.00	*	*
1966	846	0.9016	763	765	0.00	*	*
1967	858	0.9016	774	776	0.00	*	*
1968	788	1.0000	788	787	0.00	*	*
1969	799	1.0000	799	798	0.00	799	0.00
1970	841	1.0000	841	*	*	841	0.00

	Projected Totals		
	1963,65-69	1969-70	Mean[a]
1971	819	883	851
1972	830	925	878
1973	841	967	904
1974	852	1,009	931
1975	863	1,051	957
1976	874	1,093	984
1977	884	1,135	1,010
1978	895	1,177	1,036
1979	906	1,219	1,063
1980	917	1,261	1,089

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*Indicates that the values for these years were not used in computing the indicated regression.

[a] The mean of the two predictions was used in aggregating the projections to arrive at a final projection of total Direct Patient Care Physicians in Obstetrics and Gynecology.

Appendix A - Contd.

Table 18.a.

Projections of Growth for Direct Patient Care M.D.'s in the Specialty of Occupational Medicine (r = -0.9517, Regression Equation = -3,5118 x +7,042.7203)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	130	1.6667	152	149	-0.02
1964	123	1.6667	144	146	0.01
1965	121	1.6667	141	142	0.01
1966	119	1.6667	139	139	0.00
1967	115	1.6667	134	135	0.01
1968	126	1.0000	126	132	0.05
1969	130	1.0000	130	128	-0.02
1970	127	1.0000	127	125	-0.02
			Projected Totals[a]		
1971			121		
1972			117		
1973			114		
1974			110		
1975			107		
1976			103		
1977			100		
1978			96		
1979			93		
1980			89		

[a] A possible alternative projection would be to assume that the somewhat stable trend of the period 1968-70 will continue, i.e., a projection of the median of this period, i.e., 127 for each year of the 1970s.

Appendix A - Contd.

Table 19.a.

Projections of Growth for Direct Patient Care M.D.'s in Ophthalmology
(r = 0.9908, Regression Equation = 8.4407 x -16,134.9368)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimates	Error
1963	448	0.9675	433	434	0.00
1964	455	0.0675	440	443	0.01
1965	465	0.9675	450	451	0.00
1966	480	0.9675	464	460	-0.01
1967	488	0.9675	472	468	-0.01
1968	476	1.0000	476	476	0.00
1969	482	1.0000	482	485	0.01
1970	492	1.0000	492	493	0.00
			Projected Totals		
1971			502		
1972			510		
1973			519		
1974			527		
1975			535		
1976			544		
1977			552		
1978			561		
1979			569		
1980			578		

Appendix A - Contd.

Table 20.a.

Projections of Growth for Direct Patient Care M.D.'s in Orthopedic Surgery (r = 0.9907, Regression Equation = 12.2386 x -23,792.3841)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	239	0.9575	229	232	0.01
1964	262	0.9575	251	244	-0.03
1965	269	0.9575	258	256	-0.01
1966	274	0.9575	262	269	0.03
1967	291	0.9575	279	281	0.01
1968	293	1.0000	293	293	0.00
1969	309	1.0000	309	305	-0.01
1970	317	1.0000	317	318	0.00
			Projected Totals		
1971			330		
1972			342		
1973			354		
1974			367		
1975			379		
1976			391		
1977			403		
1978			416		
1979			428		
1980			440		

Appendix A-Contd.

Table 21.a.

Projections of Growth for Doctors of Osteopathy Based upon Historical Figures Supplied by the American Osteopathic Association.

Year	D.O.'s	Corrected Totals[c]	Estimated Direct Patient Care[d]
1970	1,667[a]	1,667	1,220
1971	1,662[b]	1,694	1,239
1972	1,688	1,720	1,258
1973	1,715	1,747	1,278
1974	1,742	1,774	1,298
1975	1,768	1,800	1,317
1976	1,795	1,827	1,337
1977	1,821	1,853	1,356
1978	1,848	1,880	1,375
1979	1,874	1,906	1,394
1980	1,901	1,933	1,414

[a] Actual count from 1971 Directory of the American Osteopathic Association.

[b] This figure and succeeding figures are based upon a linear correlation between time (year) and historical data provided in a communication from the American Osteopathic Association.

[c] The linear projection for 1970 was 1,635 which is lower than the actual figure by a margin of 32. Since this represented the only large departure from the linear estimates for the 1960s it was used as a correction for the linear projections, e.g., 1,662 + 32 = 1,694.

[d] 73.16% estimate factor is used which is derived from 1971 American Osteopathic Association Directory findings as reported in "A Profile of Osteopathic Physicians in Pennsylvania" published by the Program Audit Division, Office of the Budget, Commonwealth of Pennsylvania, 1971, i.e., 1213 ÷ 1658 = 0.7316 (see page 5 of that study).

Appendix A - Contd.

Table 22.a.

Projections of Growth for Physicians (M.D.) in Other Non-Patient Care Activities (r = 0.9530, Regression Equation = 16.8928 x -33,129.1662)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	-[a]	Residual[b]	42	31	-0.26
1964	-	"	45	48	0.07
1965	-	"	64	65	0.02
1966	-	"	56	82	0.46
1967	-	"	106	99	-0.07
1968	131	1.0000	131	116	-0.14
1969	140	1.0000	140	133	-0.05
1970	141	1.0000	141	150	0.06
			Projected Totals		
1971			167		
1972			183		
1973			200		
1974			217		
1975			234		
1976			251		
1977			268		
1978			285		
1979			302		
1980			319		

[a] No figure is given because the category of physicians did not exist prior to the 1968 reclassification by the AMA.

[b] The estimate of the true figure, if the 1968 reclassification had been in effect, had to be arrived at by totaling all of the other estimates and subtracting the total from the corrected total of all physicians listed by the AMA that year, i.e., a residual.

Appendix A-Contd.

Table 23.a.

Projections of Growth for Direct Patient Care M.D.'s in Other Specialties (r = 0.9313, Regression Equation = 13.5874 x -26,651.7055 for Years 1963-70 With 1967 and 1969 Deleted as Anomalous)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate[a]	Error
1963	24	1.1034	26	20	-0.23
1964	34	1.1034	38	34	-0.10
1965	40	1.1034	44	48	0.09
1966	56	1.1034	62	61	-0.02
1967	55	1.1034	61	*	*
1968	64	1.0000	64	88	0.38
1969	215	1.0000	215	*	*
1970	133	1.0000	133	115	-0.14
			Projected Totals[b]		
1971			129		
1972			143		
1973			156		
1974			170		
1975			183		
1976			197		
1977			211		
1978			224		
1979			238		
1980			251		

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*Indicates data not used for regression estimate.

[a] Remarkable fluctuation in figures for recent years and also a dramatic increase. Makes projection difficult but may well reflect an accelerating trend to increased specialization.

[b] If the figures for 1967 and 1969 had been included, the correlation would have fallen to 0.7812 because of the existence of anomalous data for these dates relative to overall trend. Even so, 133 for 1970 still represents a marked, somewhat nonlinear departure from the overall previous growth pattern.

Appendix A - Contd.

Table 24.a.

Projections of Growth for Direct Patient Care M.D.'s in Otolaryngology ($r = -0.75$, Regression Equation = $-2.5485\ x + 5{,}273.9983$ for 1963-70 and $r = 0.9986$, Regression Equation = $5.5\ x - 10{,}572.8333$ for 1968-70)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	1963-70 Regression Estimate	Error	1968-70 Regression Estimate	Error
1963	332	0.8367	278	271	-0.03	*	*
1964	322	0.8367	269	269	0.00	*	*
1965	317	0.8367	265	266	0.00	*	*
1966	310	0.8367	259	264	0.02	*	*
1967	308	0.8367	258	261	0.01	*	*
1968	251	1.0000	251	259	0.03	251	0.00
1969	257	1.0000	257	256	0.00	257	0.00
1970	262	1.0000	262	253	-0.03	262	0.00

	Projected Totals		
	1963-70	1968-70	Mean[a]
1971	251	268	262
1972	248	273	265
1973	246	279	268
1974	243	284	270
1975	241	290	274
1976	238	295	276
1977	236	301	279
1978	233	306	282
1979	231	312	285
1980	228	317	287

*Indicates the figures for this date were not used in computing the regression equation.

[a] This is a series of a weighted means, actually, giving a weight of 2 to the 1968-70 figure and a weight of 1 to the 1963-70 projection, e.g., 268 + 268 + 251 = 262. These weighted mean values were later used to estimate the Direct Patient Care total by aggregation since it was assumed that they best represented probable future growth.

Appendix A-Contd.

Table 25.a.

Projections of Growth for Direct Patient Care M.D.'s in Pathology and Forensic Pathology ($r = 0.9954$, Regression Equation $= 13.2148\,x - 25{,}729.1149$ for Pathology and Median of 6 for Projections of Forensic Pathology)

Year	Uncorrected Totals[a]	Correction Factor[b]	Corrected Totals	Regression Estimates	Error
1963	267 4	0.7989 1.5000	213 6 (219)	212 6 (218)	0.00
1964	279 4	0.7989 1.5000	223 6 (229)	225 6 (231)	0.01
1965	302 4	0.7989 1.5000	241 6 (247)	238 6 (244)	-0.01
1966	312 4	0.7989 1.5000	249 6 (255)	251 6 (257)	0.01
1967	324 3	0.7989 1.5000	259 5 (264)	264 6 (270)	0.02
1968	282 6	1.0000 1.0000	282 6 (288)	278 6 (284)	-0.01
1969	291 5	1.0000 1.0000	291 5 (296)	291 6 (297)	0.00
1970	304 6	1.0000 1.0000	304 6 (310)	304 6 (310)	0.00

	Projection Totals		
	Path.	F.Path.	Total
1971	317	6	323
1972	330	6	336
1973	344	6	350
1974	357	6	363
1975	370	6	376
1976	383	6	389
1977	397	6	403
1978	410	6	416
1979	423	6	429
1980	436	6	442

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[a] Figures are for the total of Pathologists (Upper) and Forensic Pathologists (Lower).

[b] Correction figures for the Pathologist total (Upper) and the Forensic Pathologist total.(Lower).

Appendix A-Contd.

Table 26.a.

Projection of Growth for Direct Patient Care M.D.'s in Pediatrics (r = 0.9982, Regression Equation = 27.5002 x -53,609.0281 for Years 1967-70)

Years	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	529	0.8682	459	*	*
1964	552	0.8682	479	*	*
1965	542	0.8682	471	*	*
1966	538	0.8682	467	*	*
1967	555	0.8682	482	484	0.00
1968	514	1.0000	514	511	0.01
1969	540	1.0000	540	539	0.00
1970	565	1.0000	565	566	0.00
			Projected Totals		
1971			594		
1972			622		
1973			649		
1974			677		
1975			704		
1976			732		
1977			759		
1978			787		
1979			814		
1980			842		

* Indicates that the corrected total for that year was considered as not representative of the more recent trend pattern and therefore could not be used in deriving the regression equation.

Appendix A-Contd.

Table 27.a.

Projections of Growth for Direct Patient Care M.D.'s in Physical Medicine and Rehabilitation (r = 0.9738, Regression Equation = 2.8331 x 5,514.2139)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	45	1.0333	47	47	0.00
1964	51	1.0333	53	50	-0.06
1965	50	1.0333	52	53	0.02
1966	52	1.0333	54	56	0.04
1967	55	1.0333	57	58	0.02
1968	62	1.0000	62	61	-0.02
1969	66	1.0000	66	64	-0.03
1970	67	1.0000	67	67	0.00
			Projected Totals		
1971			70		
1972			73		
1973			75		
1974			78		
1975			81		
1976			84		
1977			87		
1978			90		
1979			92		
1980			95		

Appendix A-Contd.

Table 28.a.

Projections of Growth for Direct Patient Care M.D.'s in Plastic Surgery (r = 0.9912, Regression Equation = 2.1787 x -4,233.4461)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	37	1.1250	42	43	0.02
1964	41	1.1250	46	45	-0.02
1965	43	1.1250	48	48	0.00
1966	44	1.1250	50	50	0.00
1967	47	1.1250	53	52	-0.02
1968	54	1.0000	54	54	0.00
1969	56	1.0000	56	56	0.00
1970	58	1.0000	58	59	0.02
			Projected Totals		
1971			61		
1972			63		
1973			65		
1974			67		
1975			69		
1976			72		
1977			74		
1978			76		
1979			78		
1980			80		

Appendix A-Contd.

Table 29.a.

Projections of Growth for Direct Patient Care M.D.'s in General Preventative Medicine (Based on value for last three years, Median = 13)

Year	Uncorrected Totals	Correction Factor	Corrected Totals
1963	17	1.0000	17
1964	19	1.0000	19
1965	21	1.0000	21
1966	22	1.0000	22
1967	16	1.0000	16
1968	14	1.0000	14
1969	13	1.0000	13
1970	13	1.0000	13
			Projected Totals
1971			13
1972			13
1973			13
1974			13
1975			13
1976			13
1977			13
1978			13
1979			13
1980			13

Appendix A-Contd.

Table 30.a.

Projections of Growth for Direct Patient Care M.D.'s in Psychiatry and Child Psychiatry (r = 0.9898, Regression Equation = 29.2143 x -56,817.4052 for Psychiatry and 4 = 0.9949, Regression Equation = 11.2501 x -22,036.3621 for Child Psychiatry)

Year	Uncorrected Totals[a]	Correction Factor[b]	Corrected Totals	Regression Estimates	Error
1963	611 30	0.8814 1.4521	539 44 (583)	530 48 (578)	-0.01
1964	640 44	0.8814 1.4521	564 64 (628)	560 59 (619)	-0.01
1965	654 48	0.8814 1.4521	576 70 (646)	589 70 (659)	0.02
1966	689 55	0.8814 1.4521	607 80 (687)	618 81 (699)	0.02
1967	734 62	0.8814 1.4521	647 90 (737)	647 93 (740)	0.00
1968	691 106	1.0000 1.0000	691 106 (797)	676 104 (780)	-0.02
1969	695 116	1.0000 1.0000	695 116 (811)	706 115 (821)	0.01
1970	741 125	1.0000 1.0000	741 125 (866)	735 126 (861)	-0.01

	Projected Totals		
	Psy.	Child Psy.	Total
1971	764	138	902
1972	793	149	942
1973	822	160	982
1974	852	171	1,023
1975	881	183	1,064
1976	910	194	1,104
1977	939	205	1,144
1978	969	216	1,185
1979	998	228	1,226
1980	1,027	239	1,266

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[a] Upper figure represents the Psychiatry total and the lower figure represents the Child Psychiatry total.

[b] Upper figure represents the Psychiatry total correction factor and the lower figure represents the Child Psychiatry total figure correction factor.

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Table 31.a.

Projections of Growth for Direct Patient Care M.D.'s in Public Health (Based Upon Median of Period 1966-70)

Year	Uncorrected Totals	Correction Factor	Corrected Totals
1963	38	0.8929	34
1964	34	0.8929	30
1965	30	0.8929	27
1966	27	0.8929	24
1967	26	0.8929	23
1968	25	1.0000	25
1969	22	1.0000	22
1970	24	1.0000	24
		Projected Totals[a]	
1971		24	
1972		24	
1973		24	
1974		24	
1975		24	
1976		24	
1977		24	
1978		24	
1979		24	
1980		24	

---

[a] Based upon the fact that the number of physicians in this specialty has apparently stabilized at approximately 24, i.e., the median figure for 1966-70.

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Table 32.2.

Projections of Growth for Direct Patient Care M.D.'s in the Specialty of Pulmonary Disease (r = -0.5112, Regression Equation = -0.7143 x +1,472.1945 for Years 1963-70 and r = 0.9135, Regression Equation = 2.2 x -4,265.2 for Years 1967-70)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	1963-70 Regression Estimate	Error	1967-70 Regression Estimate	Error
1963	45	1.5714	71	70	-0.01	*	*
1964	46	1.5714	72	69	-0.04	*	*
1965	44	1.5714	69	69	0.00	*	*
1966	42	1.5714	66	68	0.03	*	*
1967	39	1.5714	61	67	0.10	65	-0.03
1968	66	1.0000	66	66	0.00	65	-0.02
1969	67	1.0000	67	66	-0.02	67	0.02
1970	68	1.0000	68	65	-0.04	67	0.03

Year	Projected Totals[a] 1963-70	1967-70	Mean
1971	65	71	68
1972	65	73	69
1973	63	75	69
1974	62	78	70
1975	61	80	71
1976	61	82	72
1977	60	84	72
1978	59	86	73
1979	59	89	74
1980	58	91	75

*Indicates data for this year was not used to obtain regression equation.

[a] The mean of the overall 1963-70 trend and the more recent 1967-70 trend has been taken as most reasonable since there is a possibility that the incidence of pulmonary disease is rising somewhat despite the advances in treating Tuberculosis i.e., emphysema due to smoking, air pollution, etc.

Appendix A-Contd.

Table 33.a.

Projections of Growth for Direct Patient Care M.D.'s in Radiology, Therapeutic Radiology and Diagnostic Radiology (r = 0.9915, Regression Equation = 16.9768 x -32,978.6882 With Median 1968-70 Values of 32 and 59 for Therapeutic (TR) and Diagnostic Radiology (DR) Respectively)

Year	Uncorrected Totals[a]	Correction Factor[a]	Corrected Totals	Regression Estimates	Error
1963	435	0.80	348	347	0.00
	0	6.60	0(407)	*	*
	2	29.50	59	*	*
1964	460	0.80	368	364	-0.01
	0	6.60	0(457)	*	*
	3	29.50	89	*	*
1965	472	0.80	378	381	0.01
	1	6.60	7(415)	*	*
	1	29.50	30	*	*
1966	497	0.80	398	398	0.00
	1	6.60	7(435)	*	*
	1	29.50	30	*	*
1967	516	0.80	413	415	0.01
	3	6.60	20(492)	*	*
	2	29.50	59	*	*
1968	428	0.80	428	432	0.01
	33	6.60	33(520)	*	*
	59	29.50	59	*	*
1969	441	0.80	441	449	0.02
	32	6.60	32(530)	*	*
	57	29.50	57	*	*
1970	476	0.80	476	466	-0.02
	32	0.60	32(572)	*	*
	64	29.50	64	*	*

		Projected Totals		
	Radiology	Ther. Radiology	Diag. Radiology	Total Estimate
1971	483	32	59	574
1972	500	32	59	591
1973	517	32	59	608
1974	534	32	59	625
1975	551	32	59	642
1976	568	32	59	659
1977	585	32	59	676
1978	602	32	59	693
1979	619	32	59	710
1980	635	32	59	726

[a] Figures are for the correction factors and totals of Radiologists (upper figure), Therapeutic Radiologist (middle figure) and Diagnostic Radiologists (lower figure).

*Data not used for regression.

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Table 34.a.

Projections of Growth for Physicians (M.D.) Engaged in Research (r = 0.9595, Regression Equation = 95.3936 x -186,731.5224 for Years 1963-1967 and r = 0.9407, Regression Equation = -92.7032 x +183,223.5386 for Years 1967-70)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	1963-67 Regression Estimate	Error	1967-70 Regression Estimate	Error
1963	154	3.3796	520	526	0.01	*	
1964	172	3.3796	580	622	0.07	*	
1965	229	3.3796	774	717	-0.07	*	
1966	250	3.3796	845	812	-0.04	*	
1967	256	3.3796	865	908	0.05	876	0.01
1968	828	1.0000	828	*		784	-0.05
1969	636	1.0000	636	*		691	0.09
1970	620	1.0000	620	*		598	-0.04

	Projected Totals		
Year	1963-67	1967-70	Final Projection[a]
1971	1,289	506	570
1972	1,385	413	570
1973	1,480	320	570
1974	1,575	227	570
1975	1,671	135	570
1976	1,766	42	570
1977	1,862	-51	570
1978	1,957	-143	570
1979	2,052	-236	570
1980	2,148	-329	570

*Indicates data not used to estimate regression.

[a] The two regression trends are both so extreme as to be meaningless for projection purposes. Even the mean (weighted or otherwise) of the two does not yield projections that seem reasonable. It was therefore decided that the mean of the 1963 and 1970 figures might be most representative of a suspected leveling off of medical research in the 1970s, i.e., 520 + 620 ÷ 2 = 570.

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Table 35.a.

Projections of Growth for Physicians (M.D.) in Residency in Pennsylvania Based Upon the 1960's (r = 0.9909, Regression Equation = 111.3612 x -216,978.5657)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimates	Error
1963	1,782	0.9295	1,656	1,624	-0.02
1964	1,826	0.9295	1,697	1,735	0.02
1965	2,042	0.9295	1,898	1,846	-0.03
1966	2,052	0.9295	1,907	1,958	0.03
1967	2,225	0.9295	2,068	2,069	0.00
1968	2,148	1.0000	2,148	2,180	0.01
1969	2,302	1.0000	2,302	2,292	0.00
1970	2,430	1.0000	2,430	2,403	-0.01

Year	Projected Totals[a]
1971	2,514
1972	2,626
1973	2,737
1974	2,848
1975	2,960
1976	3,071
1977	3,183
1978	3,294
1979	3,405
1980	3,517

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[a] The projections shown here are purely those totals we might expect on the basis of past growth experience. Undoubtedly, they are too low if we expand our graduate output as anticipated and take steps to expand and make more attractive our residency offerings.

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Table 36.a.

Projections of Growth for Direct Patient Care M.D.'s in Thoracic Surgery (r = 0.9889, Regression Equation = 3.5358 x -6,896.1201)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	49	0.9403	46	45	-0.02
1964	52	0.9403	49	48	-0.02
1965	52	0.9403	49	52	0.06
1966	59	0.9403	55	55	0.00
1967	63	0.9403	59	59	0.00
1968	63	1.0000	63	62	0.02
1969	67	1.0000	67	66	0.02
1970	69	1.0000	69	69	0.00
			Projected Totals		
1971			73		
1972			77		
1973			80		
1974			84		
1975			87		
1976			91		
1977			94		
1978			98		
1979			101		
1980			105		

Appendix A-Contd.

Table 37.a.

Projections of Growth for Direct Patient Care M.D.'s in Unspecified Specialty Areas (r = 0.9656, Regression Equation = 9.9424 x -19,497.0850 for the Years 1965-70)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	37	1.3400	50	*	*
1964	33	1.3400	44	*	*
1965	33	1.3400	44	40	-0.09
1966	37	1.3400	50	50	0.00
1967	39	1.3400	52	60	0.15
1968	67	1.0000	67	70	0.04
1969	86	1.0000	86	80	-0.07
1970	89	1.0000	89	89	0.00
			Projected Totals		
1971			99		
1972			109		
1973			119		
1974			129		
1975			139		
1976			149		
1977			159		
1978			169		
1979			179		
1980			189		

*Indicates data not used to compute regression equation.

Appendix A-Contd.

Table 38.a.

Projections of Growth for Direct Patient Care M.D.'s in Urology
(r = 0.9783, Regression Equation = 6.8574 x -13,254.32907)

Year	Uncorrected Totals	Correction Factor	Corrected Totals	Regression Estimate	Error
1963	230	0.9064	208	207	0.00
1964	237	0.9064	215	214	0.00
1965	243	0.9064	220	221	0.00
1966	250	0.9064	227	227	0.00
1967	255	0.9064	231	234	0.01
1968	242	1.0000	242	241	0.00
1969	242	1.0000	242	248	0.02
1970	261	1.0000	261	255	-0.02

Year	Projected Totals
1971	262
1972	269
1973	275
1974	282
1975	289
1976	296
1977	303
1978	310
1979	317
1980	323

Appendix B

Table 1b

Summary of Resident Physicians (November 26, 1971) Graduating From Pennsylvania Medical Schools, 1960-1971

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	Total
Family Practice													
Direct Patient Care	1	1	0	2	1	1	3	0	0	1	0	0	10
Resident	0	0	0	0	0	0	1	0	0	3	7	2	13
Intern	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	1	0	2	1	1	4	0	0	4	7	2	23
General Practice													
Direct Patient Care	51	28	32	40	27	26	13	12	10	4	6	0	249
Resident	0	0	0	0	0	1	1	2	0	1	0	0	5
Intern	0	0	0	0	0	0	0	0	0	0	1	0	1
Other	0	1	0	0	0	0	0	1	0	0	1	0	3
Total	51	29	32	40	27	27	14	15	10	5	8	0	258
General Surgery													
Direct Patient Care	16	12	12	14	6	16	6	3	6	5	1	0	97
Resident	1	0	0	0	4	7	14	28	17	20	31	2	124
Intern	0	0	0	0	0	0	0	0	0	0	0	25	25
Other	0	2	0	0	0	0	2	0	0	1	1	0	6
Total	17	14	12	14	10	23	22	31	23	26	33	27	252
Internal Medicine													
Direct Patient Care	31	27	21	17	14	4	8	5	16	7	4	0	154
Resident	0	2	1	1	0	2	12	30	21	51	59	3	182
Intern	0	0	0	0	0	0	0	0	0	0	0	94	94
Other	4	3	2	2	2	2	1	1	0	3	1	0	21
Total	35	32	24	20	16	8	21	36	37	61	64	97	451
Pediatrics													
Direct Patient Care	13	18	12	10	6	12	5	9	5	2	3	0	95
Resident	0	0	0	0	1	1	4	8	4	23	14	5	60
Intern	0	0	0	0	0	0	0	0	0	0	0	21	21
Other	2	3	0	1	3	2	2	1	0	0	1	0	15
Total	15	21	12	11	10	15	11	18	9	25	18	26	191
Physicians Other Than Basic Care													
Direct Patient Care	97	111	102	113	95	70	45	38	29	14	23	0	737
Resident	2	3	3	7	21	35	71	102	116	105	90	6	561
Intern	0	0	0	0	0	0	0	0	1	0	1	182	184
Other	18	21	24	10	14	9	7	2	4	0	1	1	111
Total	117	135	129	130	130	114	123	142	150	119	115	189	1,593
Grand Total	236	232	209	217	194	188	195	242	229	240	245	341	2,768
Direct Patient Care	209	197	179	196	149	129	80	67	66	33	37	0	1,342
Resident	3	5	4	8	26	46	103	170	158	203	201	18	945
Intern	0	0	0	0	0	0	0	0	1	0	2	322	325
Other	24	30	26	13	19	13	12	5	4	4	5	1	156

Appendix B
(continued)

Table 2b

Summary of Resident Physicians (November 26, 1971) Graduating From Out-of-State Medical Schools, 1960-1971

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	Total
Family Practice													
Direct Patient Care	0	0	0	1	1	1	1	0	0	0	1	0	5
Resident	0	0	0	0	0	0	0	0	3	3	6	2	14
Intern	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	1	0	0	0	0	0	1
Total	0	0	0	1	1	1	2	0	3	3	7	2	20
General Practice													
Direct Patient Care	8	5	8	16	8	11	9	8	7	5	2	0	87
Resident	0	0	0	0	0	0	1	0	0	0	0	0	1
Intern	0	0	0	0	0	0	0	0	1	0	0	0	1
Other	0	0	0	1	0	1	0	0	0	0	0	0	2
Total	8	5	8	17	8	12	10	8	8	5	2	0	91
General Surgery													
Direct Patient Care	8	5	5	4	6	5	5	3	5	4	1	0	51
Resident	0	0	0	0	3	7	11	13	8	14	15	0	71
Intern	0	0	0	0	0	0	0	0	0	0	0	23	23
Other	2	0	0	1	0	0	0	1	0	0	0	0	4
Total	10	5	5	5	9	12	16	17	13	18	16	23	149
Internal Medicine													
Direct Patient Care	4	16	4	8	5	7	6	7	10	8	3	0	78
Resident	0	1	0	0	0	2	8	14	15	30	34	1	105
Intern	0	0	0	0	0	1	0	0	0	0	0	57	58
Other	4	1	6	4	2	2	2	1	2	1	0	0	25
Total	8	18	10	12	7	12	16	22	27	39	37	58	266
Pediatrics													
Direct Patient Care	4	5	6	10	4	7	5	3	0	1	0	0	45
Resident	0	0	0	1	1	0	3	2	5	12	18	0	42
Intern	0	0	0	0	0	0	0	0	0	0	0	17	17
Other	2	0	2	1	0	4	2	1	0	1	0	0	13
Total	6	5	8	12	5	11	10	6	5	14	18	17	117
Physicians Other Than Basic Care													
Direct Patient Care	53	49	48	57	51	34	32	20	32	13	10	0	399
Resident	6	7	7	12	23	48	44	70	86	77	49	11	440
Intern	0	0	0	0	1	0	0	0	0	0	1	73	75
Other	12	20	18	17	18	12	15	13	4	3	5	1	138
Total	71	76	73	86	93	94	91	103	122	93	65	85	1,052
Grand Total	103	109	104	133	123	142	145	156	178	172	145	185	1,695
Direct Patient Care	77	80	71	96	75	65	58	41	54	31	17	0	665
Resident	6	8	7	13	27	57	67	99	117	136	122	14	673
Intern	0	0	0	0	1	1	0	0	1	0	1	170	174
Other	20	21	26	24	20	19	20	16	6	5	5	1	183

Appendix B
(Continued)

Table 3b

Summary of Resident Physicians (November 26, 1971) Graduating From Canadian Medical Schools, 1960-71

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	Total
Family Practice													
Direct Patient Care	0	0	1	0	0	0	0	0	0	0	0	0	1
Resident	0	0	0	0	0	0	0	0	0	0	0	0	0
Intern	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	0	0	0	0	0	0	0	0	1
General Practice													
Direct Patient Care	0	0	0	0	0	1	1	0	0	0	0	0	2
Resident	0	0	0	0	0	0	0	0	0	0	0	0	0
Intern	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	1	0	0	0	0	0	2
General Surgery													
Direct Patient Care	0	0	0	1	2	0	0	0	0	0	0	0	3
Resident	0	0	0	0	0	0	0	1	0	0	1	0	2
Intern	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	2	0	0	1	0	0	1	0	5
Internal Medicine													
Direct Patient Care	0	0	0	0	0	0	0	0	0	0	0	0	0
Resident	0	0	0	0	0	1	0	0	1	0	0	0	2
Intern	0	0	0	0	0	0	0	0	0	0	0	1	1
Other	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	0	0	1	0	0	1	3
Pediatrics													
Direct Patient Care	0	0	0	0	0	0	0	0	1	0	0	0	1
Resident	0	0	0	0	0	0	1	0	0	0	1	0	2
Intern	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	2	0	1	0	0	0	0	0	0	3
Total	0	0	0	2	0	1	1	0	1	0	1	0	6
Physicians Other Than Basic Care													
Direct Patient Care	4	5	3	2	0	1	0	1	0	0	0	0	16
Resident	0	1	0	2	1	2	3	2	6	3	1	0	21
Intern	0	0	0	0	0	0	0	0	0	0	0	2	2
Other	2	1	3	1	0	2	1	1	0	0	0	0	11
Total	6	7	6	5	1	5	4	4	6	3	1	2	50
Grand Total	6	7	7	8	3	8	6	5	8	3	3	3	67
Direct Patient Care	4	5	4	3	2	2	1	1	1	0	0	0	23
Resident	0	1	0	2	1	3	4	3	7	3	3	0	27
Intern	0	0	0	0	0	0	0	0	0	0	0	3	3
Other	2	1	3	3	0	3	1	1	0	0	0	0	14

Appendix B
(Continued)

Table 4b

Summary of Resident Physicians (November 26, 1971) Graduating From Foreign Medical Schools

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	Total
Family Practice													
Direct Patient Care	0	0	0	0	0	0	0	0	0	0	0	0	0
Resident	0	0	0	0	0	0	0	0	0	0	0	0	0
Intern	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
General Practice													
Direct Patient Care	2	3	5	4	5	6	3	1	2	1	2	0	34
Resident	2	0	3	3	0	2	6	5	1	1	0	1	24
Intern	0	0	0	0	0	0	0	1	0	0	0	0	1
Other	0	0	0	1	1	1	0	0	0	0	0	0	3
Total	4	3	8	8	6	9	9	7	3	2	2	1	62
General Surgery													
Direct Patient Care	7	5	9	7	5	4	0	1	2	1	0	0	41
Resident	2	6	12	6	16	22	25	29	15	10	4	0	147
Intern	0	0	0	1	0	0	0	2	8	1	1	1	14
Other	0	1	2	0	0	1	2	0	0	1	0	0	7
Total	9	12	23	14	21	27	27	32	25	13	5	1	209
Internal Medicine													
Direct Patient Care	3	8	5	6	7	6	2	2	1	1	0	0	41
Resident	5	8	0	6	9	9	22	20	20	10	4	0	113
Intern	1	0	0	0	0	2	1	4	3	1	4	5	21
Other	3	1	2	2	0	1	0	1	1	0	0	0	11
Total	12	17	7	14	16	18	25	27	25	12	8	5	186
Pediatrics													
Direct Patient Care	6	8	8	2	2	3	2	1	1	0	0	0	33
Resident	0	2	6	3	12	9	15	8	3	4	2	0	64
Intern	0	0	0	0	0	1	0	1	0	2	2	1	7
Other	0	0	0	1	0	0	0	0	0	0	0	0	1
Total	6	10	14	6	14	13	17	10	4	6	4	1	105
Physicians Other Than Basic Care													
Direct Patient Care	58	56	67	47	42	39	20	11	1	3	1	0	345
Resident	14	37	26	41	59	87	102	69	50	27	17	1	530
Intern	0	1	5	4	14	16	21	27	21	45	78	9	241
Other	14	20	18	17	14	5	7	4	2	3	1	0	105
Total	86	114	116	109	129	147	150	111	74	78	97	10	1,221
Grand Total	117	156	168	151	186	214	228	187	131	111	116	18	1,783
Direct Patient Care	76	80	94	66	61	58	27	16	7	6	3	0	494
Resident	23	53	47	59	96	129	170	131	89	52	27	2	878
Intern	1	1	5	5	14	19	22	35	32	49	85	16	284
Other	17	22	22	21	15	8	9	5	3	4	1	0	127

Appendix B
(Continued)

Table 5b

Summary of Resident Physicians (November 26, 1971) Graduating From All Medical Schools Combined

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	Total
Family Practice													
Direct Patient Care	1	1	1	3	2	2	4	0	0	1	1	0	16
Resident	0	0	0	0	0	0	1	0	3	6	13	4	27
Intern	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	1	0	0	0	0	0	1
Total	1	1	1	3	2	2	6	0	3	7	14	4	44
General Practice													
Direct Patient Care	61	36	45	60	40	44	26	21	19	10	10	0	372
Resident	2	0	3	3	0	3	8	7	1	2	0	1	30
Intern	0	0	0	0	0	0	0	1	1	0	1	0	3
Other	0	1	0	2	1	2	0	1	0	0	1	0	8
Total	63	37	48	65	41	49	34	30	21	12	12	1	413
General Surgery													
Direct Patient Care	31	22	26	26	19	35	11	7	13	10	2	0	202
Resident	3	6	12	6	23	36	50	71	40	44	51	2	344
Intern	0	0	0	1	0	0	0	2	8	1	1	49	62
Other	2	3	2	1	0	1	3	1	0	2	1	0	16
Total	36	31	40	34	42	72	64	81	61	57	55	51	624
Internal Medicine													
Direct Patient Care	38	51	30	31	26	17	16	14	27	16	7	0	273
Resident	5	11	1	7	9	14	42	64	57	91	97	4	402
Intern	1	0	0	0	0	3	1	4	3	1	4	157	174
Other	11	5	10	8	4	5	3	3	3	4	1	0	57
Total	5[illegible]	67	41	46	39	39	62	85	90	112	109	161	906
Pediatrics													
Direct Patient Care	23	31	26	22	12	22	12	13	7	3	3	0	174
Resident	0	2	6	4	14	10	23	18	12	39	35	5	168
Intern	0	0	0	0	0	1	0	1	0	2	2	39	45
Other	4	3	2	5	3	7	4	2	0	1	1	0	32
Total	27	36	34	31	29	40	39	34	19	45	41	44	419
Physicians Other Than Basic Care													
Direct Patient Care	212	221	220	219	188	144	97	70	62	30	34	0	1,497
Resident	22	48	36	62	104	172	220	243	258	212	157	18	1,552
Intern	0	1	5	4	15	16	21	27	22	45	80	266	502
Other	46	62	63	45	46	28	30	20	10	6	7	2	365
Total	280	332	324	330	353	360	368	360	352	293	278	286	3,916
Grand Total	462	504	488	509	506	562	573	590	546	526	509	547	6,322
Direct Patient Care	366	362	348	361	287	264	166	125	128	70	57	0	2,534
Resident	32	67	58	82	150	235	344	403	371	394	353	34	2,523
Intern	1	1	5	5	15	20	22	35	34	49	88	511	786
Other	63	74	77	61	54	43	41	27	13	13	11	2	479

Appendix C

Table 1c

Computations of Pennsylvania Medical School Graduate Physician Output

Year of Grad.	Number Entering (Y-1)	Number Surviving to 2nd Year (Y-2)	Percentage Surviving From 1st Year	Number Surviving to 3rd Year (Y-3)	Percentage Surviving From 2nd Year	Number Surviving to 4th Year (Y-4)	Percentage Surviving From 3rd Year	Number Actually Graduated	Percentage Surviving From 4th Year	Estimated Graduate Output	Estimation Formula Used[b] (Grads =)
Hahnemann Medical College Graduate Physician Output, 1961-1980											
1961						93		93	100.00	93	Y-4
1962				82		81	98.78	80	98.77	81	Y-4
1963		97		91	93.81	86	94.51	86	100.00	86	Y-4
1964	110	99	90.00	92	92.93	92	100.00	92	100.00	92	Y-4
1965	110	103	93.64	96	93.20	94	97.92	94	100.00	94	Y-4
1966	110	96	87.27	93	96.88	92	98.92	91	98.91	92	Y-4
1967	110	108	98.19	106	98.15	106	100.00	106	100.00	106	Y-4
1968	110	109	99.09	103	94.50	102	99.03	102	100.00	102	Y-4
1969	110	107	97.27	100	93.46	99	99.00	99	100.00	99	Y-4
1970	110	107	97.27	101	94.39	101	100.00	100	99.01	101	Y-4
1971	115	115	100.00	107	93.04	108	100.93	107	99.07	107	Y-4
1972	115	114	99.13	116	101.75	117	100.86			116	Y-4
1973	115	110	95.65	110	100.00					110	0.9986(Y-3)
1974	118	117	99.15							117	0.9986(Y-2)
1975	130									129	0.9899(Y-1)
1976	150[a]									148	0.9899(Y-1)
1977	180									178	0.9899(Y-1)
1978	220									218	0.9899(Y-1)
1979	240									238	0.0999(Y-1)
1980	250									247	0.0999(Y-1)
Sum of Percentages			293.93		294.79		301.79		298.08		
Mean Percentage			0.9798		0.9826		1.0060		0.9936		
Median Percentage			0.9913		1.0000		1.0086		0.9901		
Hershey Medical College Graduate Physician Output, 1971-1980											
1971	40	39	97.50	37	94.87	33	89.19	33	100.00	33	Y-4
1972	48	48	100.00	16	95.83	42	91.30	42	100.00	42	Y-4
1973	64	63	98.44	63	100.00					57	0.9025(Y-3)
1974	69	68	98.55							59	0.8649(Y-2)
1975	70									60	0.8519(Y-1)
1976	81[a]									69	0.8519(Y-1)
1977	86									73	0.8519(Y-1)
1978	92									78	0.8519(Y-1)
1979	98									84	0.8519(Y-1)
1980	103									88	0.8519(Y-1)
Sum of Percentages			394.49		290.70		180.49		200.00		
Mean Percentage			98.62		96.90		90.25		100.00		
Median Percentage			98.50		95.83		90.25		100.00		
Jefferson Medical School Graduate Physician Output, 1961-1980											
1961						169		167	98.82	169	Y-4
1962				147		147	100.00	146	99.32	147	Y-4
1963		154		150	97.40	148	98.67	148	100.00	148	Y-4
1964	176	160	90.91	156	97.50	155	99.36	154	99.35	155	Y-4
1965	176	162	92.05	158	97.53	157	99.37	157	100.00	157	Y-4
1966	175	158	90.29	156	98.73	154	98.72	154	100.00	154	Y-4
1967	178	164	92.13	165	100.61	161	97.58	161	100.00	161	Y-4
1968	176	157	89.20	157	100.00	157	100.00	157	100.00	157	Y-4
1969	176	169	96.02	168	99.41	168	100.00	167	99.40	168	Y-4
1970	176	174	98.86	169	97.13	165	97.63	165	100.00	165	Y-4
1971	186	188	101.08	185	98.40	186	100.54	184	98.92	186	Y-4
1972	192	192	100.00	195	101.56	188	96.41			188	0.9936(Y-3)
1973	192	186	96.88	193	103.76					192	0.9810(Y-2)
1974	212	211	99.53							207	0.9764(Y-1)
1975	212									207	0.9764(Y-1)
1976	223[a]									218	0.9764(Y-1)
1977	223									218	0.9764(Y-1)
1978	223									218	0.9764(Y-1)
1979	223									218	0.9764(Y-1)
1980	223									218	0.9764(Y-1)
Sum of Percentages			1,046.95		1,092.03		1,088.28		1,095.81		
Mean Percentage			95.18		99.28		98.93		99.62		
Median Percentage			99.53[c]		98.73		99.36		100.00		

Appendix C
(continued)

Table 1c

Year of Grad.	Number Enter-ing (Y-1)	Number Surviv-ing to 2nd Year (Y-2)	Percentage Surviving From 1st Year	Number Surviving to 3rd Year (Y-3)	Percentage Surviving From 2nd Year	Number Surviving to 4th Year (Y-4)	Percentage Surviving From 3rd Year	Number Actually Gradu-ated	Percentage Surviving From 4th Year	Estimated Graduate Output	Estimation Formula Used[b] (Grads =)
The Medical College of Pennsylvania Graduate Physician Output, 1961-1980											
1961						40		40	100.00	40	Y-4
1962				48		46	95.83	46	100.00	46	Y-4
1963		50		40	80.00	40	100.00	40	100.00	40	Y-4
1964	63	58	92.06	44	75.86	43	97.73	43	100.00	43	Y-4
1965	62	58	93.55	49	84.48	46	93.88	46	100.00	46	Y-4
1966	64	63	98.44	52	82.54	48	92.31	48	100.00	48	Y-4
1967	64	58	90.63	42	72.41	38	90.48	38	100.00	38	Y-4
1968	60	54	90.00	38	70.37	38	100.00	37	97.37	38	Y-4
1969	64	63	98.44	60	95.24	57	95.00	57	100.00	57	Y-4
1970	64	58	90.63	50	86.21	50	100.00	50	100.00	50	Y-4
1971	66	63	95.45	51	80.95	50	98.04	51	102.00	50	Y-4
1972	66	72	109.09	70	97.22	69	98.57	68	98.55	69	Y-4
1973	66	71	107.58	73	102.82					71	0.9773(Y-3)
1974	66	74	112.12							69	0.9308(Y-2)
1975	66									67	1.0154(Y-1)
1976	73[a]									74	1.0154(Y-1)
1977	73									74	1.0154(Y-1)
1978	73									74	1.0154(Y-1)
1979	73									74	1.0154(Y-1)
1980	73									74	1.0154(Y-1)
Sum of Percentages			1,077.99		928.10		1,061.84		1,197.92		
Mean Percentage			98.00		84.37		96.53		99.83		
Median Percentage			109.09[d]		95.24[e]		97.73		100.00		
Philadelphia College of Osteopathic Medicine Graduate Physician Output, 1961-1980											
1961						79		79	100.00	79	Y-4
1962				67		67	100.00	67	100.00	67	Y-4
1963		65		63	96.92	63	100.00	63	100.00	63	Y-4
1964	91	86	94.51	87	101.16	82	94.25	82	100.00	82	Y-4
1965	88	74	84.09	73	98.65	73	100.00	73	100.00	73	Y-4
1966	93	85	91.40	82	96.47	83	101.22	83	100.00	83	Y-4
1967	89	86	96.63	85	98.84	83	97.65	83	100.00	83	Y-4
1968	100	93	93.00	90	96.77	90	100.00	90	100.00	90	Y-4
1969	93	94	101.08	94	100.00	91	96.81	91	100.00	91	Y-4
1970	95	82	86.32	80	97.56	81	101.25	81	100.00	81	Y-4
1971	113	113	100.00	108	95.58	106	98.15	106	100.00	106	Y-4
1972	123	125	101.63	125	100.00	125	100.00	125	100.00	125	Y-4
1973	145	143	98.62	137	95.80					137	Y-3
1974	152	152	100.00							148	0.9756(Y-2)
1975	160									151	0.9427(Y-1)
1976	180[a]									170	0.9427(Y-1)
1977	200									189	0.9427(Y-1)
1978	225									212	0.9427(Y-1)
1979	250									236	0.9427(Y-1)
1980	250									23[illegible]	0.9427(Y-1)
Sum of Percentages			1,047.28		1,077.75		1,089.33		1,200.00		
Mean Percentage			95.21		97.98		99.03		100.00		
Median Percentage			96.63		97.56		100.00		100.00		
Temple University Medical School Graduate Physician Output, 1961-1980											
1961						127		125	98.43	127	Y-4
1962				128		126	98.44	126	100.00	126	Y-4
1963		127		129	101.57	124	96.12	124	100.00	124	Y-4
1964	137	130	94.89	133	102.31	131	99.25	132	99.24	132	Y-4
1965	136	124	91.18	125	100.81	124	99.20	124	100.00	124	Y-4
1966	138	130	94.20	136	104.62	132	97.06	132	100.00	132	Y-4
1967	137	131	95.62	132	100.76	131	99.24	129	98.47	131	Y-4
1968	137	142	103.65	147	103.52	143	97.28	143	100.00	143	Y-4
1969	137	133	97.08	134	100.75	134	100.00	134	100.00	134	Y-4
1970	139	135	97.12	138	100.22	136	98.55	136	100.00	136	Y-4
1971	137	134	97.81	134	100.00	134	100.00	134	100.00	134	Y-4
1972	146	142	97.26	146	102.82	145	99.32			145	Y-4
1973	146	144	98.63	145	100.69					144	0.9920(Y-3)
1974	160	159	99.38							159	Y-2
1975	160									155	0.9713(Y-1)
1976	180[a]									175	0.9713(Y-1)
1977	180									175	0.9713(Y-1)
1978	180									175	0.9713(Y-1)
1979	180									175	0.9713(Y-1)
1980	180									175	0.9713(Y-1)
Sum of Percentages			1,066.82		1,118.07		1,084.46		1,096.14		
Mean Percentage			96.98		101.64		98.59		99.65		
Median Percentage			97.12		100.81		99.20		100.00		

Appendix C
(continued)

Table 1c

Year of Grad.	Number Enter-ing (Y-1)	Number Surviv-ing to 2nd Year (Y-2)	Percentage Surviving From 1st Year	Number Surviving to 3rd Year (Y-3)	Percentage Surviving From 2nd Year	Number Surviving to 4th Year (Y-4)	Percentage Surviving From 3rd Year	Number Actually Gradu-ated	Percentage Surviving From 4th Year	Estimated Graduate Output	Estimation Formula Used[b] (Grads =)
University of Pennsylvania Medical School Graduate Physician Output, 1961-1980											
1961						130		130	100.00	130	Y-4
1962				134		134	100.00	134	100.00	134	Y-4
1963		125		130	104.00	130	100.00	130	100.00	130	Y-4
1964	125	116	92.80	120	103.45	120	100.00	120	100.00	120	Y-4
1965	125	122	97.60	126	103.28	124	98.41	124	100.00	124	Y-4
1966	129	128	99.22	134	104.69	132	98.51	124	93.94	132	Y-4
1967	126	121	96.03	127	104.96	122	96.06	122	100.00	122	Y-4
1968	127	127	100.00	129	101.57	129	100.00	129	100.00	129	Y-4
1969	125	127	101.60	130	102.36	128	98.46	128	100.00	128	Y-4
1970	125	125	100.00	129	103.20	129	100.00	125	96.90	129	Y-4
1971	133	131	98.50	135	103.05	136	100.74	134	98.53	136	Y-4
1972	132	133	100.76	136	102.26	146	107.35			146	Y-4
1973	151	149	98.68	147	98.66					147	Y-3
1974	150	147	98.00							152	1.0328(Y-2)
1975	160									163	1.0192(Y-1)
1976	160[a]									163	1.0192(Y-1)
1977	160									163	1.0192(Y-1)
1978	160									163	1.0192(Y-1)
1979	160									163	1.0192(Y-1)
1980	160									163	1.0192(Y-1)
Sum of Percentages			1,083.19		1,131.48		1,099.53		1,089.37		
Mean Percentage			98.47		102.86		109.05		99.03		
Median Percentage			98.68		103.28		100.00		100.00		
University of Pittsburgh Medical School Graduate Physician Output, 1961-1980											
1961						93		91	97.85	92	0.9882(Y-4)
1962				78		79	101.28	78	98.73	78	0.9882(Y-4)
1963		101		93	92.08	91	97.85	88	96.70	90	0.9882(Y-4)
1964	101	96	95.05	89	92.71	89	100.00	87	97.75	88	0.9882(Y-4)
1965	101	96	95.05	87	90.63	95	97.70	84	98.82	84	0.9882(Y-4)
1966	102	95	93.14	92	96.84	91	98.91	90	98.90	90	0.9882(Y-4)
1967	102	91	89.22	87	95.60	84	96.55	82	97.62	83	0.9882(Y-4)
1968	102	98	96.08	96	97.96	93	96.88	93	100.00	92	0.9882(Y-4)
1969	101	93	92.08	90	96.77	89	98.89	88	98.88	88	0.9882(Y-4)
1970	106	96	90.57	96	100.00	95	98.96	95	100.00	94	0.9882(Y-4)
1971	108	98	90.74	97	98.98	97	100.00	96	98.97	96	0.9882(Y-4)
1972	107	102	95.33	106	103.92	106	100.00			105	0.9882(Y-4)
1973	109	108	99.08	107	99.07					105	0.9831(Y-3)
1974	128	122	95.31							120	0.9875(Y-2)
1975	130									121	0.9301(Y-1)
1976	135[a]									126	0.9301(Y-1)
1977	135									126	0.9301(Y-1)
1978	135									126	0.9301(Y-1)
1979	142[f]									132	0.9301(Y-1)
1980	149[f]									139	0.9301(Y-1)
Sum of Percentages			1,031.65		1,064.56		1,087.02		1,084.12		
Mean Percentage			93.79		96.78		98.82		98.56		
Median Percentage			95.05		96.84		98.89		98.82		

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[a] Data on entry from 1976 on is based on projections of size of entering class made by the medical schools in response to a survey item.

[b] See Table 2c of this Appendix for computation of the formulas used here. The formulas for Hahnemann are based on median values for the last three items in each column in order to reflect Hahnemann's recent policy of bringing in advanced standing students and foreign medical people to make the number graduating close to the number that originally entered, i.e., compensation for attrition. It is assumed here that the best projection is that which uses the size of the class nearest to graduation.

[c] Median based on last five entries due to apparent recent trend.

[d] The value of 109.09 represents the last three years as a probable recent trend (actual median for all years is 0.9545).

[e] The value of 95.24 represents the last five years as the probable newer trend (actual median for all years is 0.8254).

[f] Pittsburgh indicates continued enrollment of 135 unless "faculty and facilities are increased." Figures are modified here on assumption of a five per cent per annum increase due to Federal or State legislation impact.

Appendix C
(continued)

Table 2c

School	Formulas*	
Formulas Used to Estimate Graduate Output		
Hahnemann	Graduates = (0.9913) (1.0000) (1.0086) (0.9901) Y-1 = 0.9899(Y-1) = (1.0000) (1.0086) (0.9901) Y-2 = 0.9986(Y-2) = (1.0086) (0.9901) Y-3 = 0.9986(Y-3) = 0.9901(Y-4)	
Hershey	Graduates = (0.9850) (0.9583) (0.9025) Y-1 = 0.8519(Y-1) = (0.9583) (0.9025) Y-2 = 0.8649(Y-2) = 0.9025(Y-3) = Y-4	
Jefferson	Graduates = (0.9953) (0.9873) (0.9936) (1.0000) Y-1 = 0.9764(Y-1) = (0.9873) (0.9936) Y-2 = 0.9810(Y-2) = 0.9936(Y-3) = Y-4	Note: (0.9953) based on last five entering classes since the retention rate is markedly greater than previously in this column.
Medical College of Pennsylvania	Graduates = (1.0909) (0.9524) (0.9773) (1.0000) Y-1 = 1.0154(Y-1) = (0.9524) (0.9773) (1.0000) Y-2 = 0.9308(Y-2) = (0.9773) (1.0000) Y-3 = 0.9773(Y-3) = Y-4	Note: (1.0909) based on last three years and (0.9524) based on last five years of data in column due to change in trend.
Philadelphia College of Osteopathic Medicine	Graduates = (0.9663) (0.9756) (1.0000) (1.0000) Y-1 = 0.9427(Y-1) = (0.9811) (1.0000) (1.0000) Y-2 = 0.9811(Y-2) = (1.0000) (1.0000) Y-3 = Y-3 = Y-4	
Temple University	Graduates = (0.9712) (1.0081) (0.9920) (1.0000) Y-1 = 0.9713(Y-1) = (1.0081) (0.9920) (1.0000) Y-2 = Y-2 = (0.9920) (1.0000) Y-3 = 0.9920(Y-3) = Y-4	
University of Pennsylvania	Graduates = (0.9868) (1.0328) (1.0000) (1.0000) Y-1 = 1.0192(Y-1) = (1.0328) (1.0000) (1.0000) Y-2 = 1.0328(Y-2) = Y-3 = Y-4	
University of Pittsburgh	Graduates = (0.9505) (0.9954) (0.9948) (0.9882) Y-1 = 0.9301(Y-1) = (0.9954) (0.9948) (0.9882) Y-2 = 0.9785(Y-2) = (0.9948) (0.9882) Y-3 = 0.9831(Y-3) = 0.9882(Y-4)	Note: (0.9954) is median value for last five entries and (0.9948) is median value of last four entries. Used because of apparent recent trends over all median value is, therefore, ignored.

*(Y-1) = number entering 1st year
(Y-2) = number entering 2nd year
(Y-3) = number entering 3rd year
(Y-4) = number entering 4th year

Appendix D

PENNSYLVANIA PHYSICIAN MANPOWER SUPPLY SURVEY

Bureau of Educational Research
Department of Education
Commonwealth of Pennsylvania

Directions:

Below you will find data categories reflecting vitally needed data to complete a study in medical manpower being carried out by the Bureau of Educational Research at the request of the Bureau of Planning Services by the Office of the Commissioner for Higher Education and in cooperation with the Bureau of the Budget of the Governor's Office.

It will, therefore, be greatly appreciated if you will enter all available data appropriate to each item for the school years indicated. Where data are not available, please enter N.A. (Not Available) in the appropriate spot.

Name of School Responding Hahnemann Medical College

Name of Responding Official ______ Date October 26, 1971

School Year	Total Number Applicants	Number Applicants from Pa.	Mean Applicant MCAT	Number Female Applicants	Size of First Year Class (Fall)	Number Penna. Students First Year
1960/61					110	
1961/62					110	
1962/63	855	412	545 545* 535 535	173	110	69
1963/64	1473	689	515 545* 515 525	157	110	78
1964/65	1882	815	530 545* 555 555	190	110	74
1965/66	1821	788	545 535* 565 565	198	110	79
1966/67	1871	724	545 565* 565 545	213	110	77
1967/68	2015	832	555 575* 570 560	229	115	85
1968/69	2370	923	568 587* 578 575	262	115	85
1969/70	2692	1047	587 558* 573 586	287	115	80
1970/71	2834	1101	550 578 551 539	321	113	82
1971/72	2588	982	550 576 547 539	294	130	82

*Mean applicant MCAT scores not available for these years. Mean MCATs for the first year class have been substituted.

Appendix D
(continued)

School Year	Number Female Students First Year	Mean MCAT First Year Class	Size of Second Year Class (Fall)	Size of Third Year Class (Fall)	Size of Fourth Year Class (Fall)
1960/61	7	-	97	82	93
1961/62	4	-	99	91	81
1962/63	3	545 545 535 535	103	92	86
1963/64	5	515 545 515 525	96	96	92
1964/65	11	530 535 555 555	108	93	94
1965/66	6	545 535 565 565	109	106	92
1966/67	9	545 565 565 545	107	103	106
1967/68	8	555 575 570 560	107	100	102
1968/69	12	568 587 578 575	115	101	99
1969/70	19	587 598 533 586	114	107	101
1970/71	14	589 609 574 580	110	116	108
1971/72	10	582 605 565 586	117	110	117

School Year	Number Graduated	Graduates Interning In Penna.	Graduates Meeting Residence Requirements in Penna.	Graduates Currently in Practice in Penna.	Outside Pa.
1960/61	93	59		38	45
1961/62	80	52		37	41
1962/63	86	52		39	44
1963/64	92	59		41	42
1964/65	94	43		36	51
1965/66	91	47		33	53
1966/67	106	64		41	52
1967/68	102	62		40	46
1968/69	99	50		34	57
1969/70	100	57		57	39
1970/71	107	53	N.A.		
1971/72	117**	N.A.			

Appendix D
(continued)

In addition to the above, please indicate the number of students you expect to be able to accept during the next decade. Place an asterisk in front of any figure that is purely an extrapolation rather than a relatively firm figure based on present plans or knowledge.

School Year	Projected or Anticipated First Year Enrollments	
1971/72	130	
1972/73	135(150)[a]	
1973/74	* 180	
1974/75	* 220	
1975/76	* 240	
1976/77	* 250	
1977/78	* 250	
1978/79	* 250	
1979/80	* 250	

[a] 150 is correct according to information received later by phone.
*Indicates a projected value.

When completed, please return to:

Dr. George E. Brehman Jr.
Research Associate
Division of Higher Education Research
Bureau of Educational Research
Department of Education
P. O. Box 911
Harrisburg, Pa. 17126

Appendix D
(continued)

PENNSYLVANIA PHYSICIAN MANPOWER SUPPLY SURVEY

Bureau of Educational Research
Department of Education
Commonwealth of Pennsylvania

Directions:

Below you will find data categories reflecting vitally needed data to complete a study in medical manpower being carried out by the Bureau of Educational Research at the request of the Bureau of Planning Services by the Office of the Commissioner for Higher Education and in cooperation with the Bureau of the Budget of the Governor's Office.

It will, therefore, be greatly appreciated if you will enter all available data appropriate to each item for the school years indicated. Where data are not available, please enter N.A. (Not Available) in the appropriate spot.

Name of School Responding The Milton S. Hershey Medical Center The Pennsylvania State University

Name of Responding Official Mrs. Gaye W. Sheffler Date 11/22/71

School Year	Total Number Applicants	Number Applicants from Pa.	Mean Applicant MCAT	Number Female Applicants	Size of First Year Class (Fall)	Number Penna. Students First Year
1960/61						
1961/62						
1962/63						
1963/64						
1964/65						
1965/66						
1966/67						
1967/68	1077	560		89	40	31
1968/69	1906	905		174	48	38
1969/70	2163	731		213	64	44
1970/71	2461	1020		282	65	38
1971/72	2339	1037		341	70	55

(continued)

School Year	Number Female Students First Year	Mean MCAT First Year Class	Size of Second Year Class (Fall)	Size of Third Year Class (Fall)	Size of Fourth Year Class (Fall)	
1960/61						
1961/62						
1962/63						
1963/64						
1964/65						
1965/66						
1966/67						
1967/68	3	587, 581, 581, 558				
1968/69	4	560, 584, 578, 567	39			
1969/70	6	572, 613, 584, 579	48	37		
1970/71	7	580, 607, 568, 564	63	46	33	
1971/72	7	598, 622, 584, 585	68	63	42	

School Year	Number Graduated	Graduates Interning In Penna.	Graduates Meeting Residence Requirements in Penna.	Graduates Currently in Practice in Penna.	
1960/61					
1961/62					
1962/63					
1963/64					
1964/65					
1965/66					
1966/67					
1967/68					
1968/69					
1969/70					
1970/71	33	14			
1971/72	42				

Appendix D
(continued)

In addition to the above, please indicate the number of students you expect to be able to accept during the next decade. Place an asterisk in front of any figure that is purely an extrapolation rather than a relatively firm figure based on present plans or knowledge.

School Year	Projected or Anticipated First Year Enrollments
1971/72	70
1972/73	81(81)*
1973/74	85
1974/75	89
1975/76	93(96)
1976/77	98
1977/78	103
1978/79	108
1979/80	108(128)

*Figures in parentheses have been added and represent those given later by President Oswold of the Pennsylvania State University in the "Penn State Intercom" of August 3, 1972 concerning guidelines for development approved by the Board of Trustees.

When completed, please return to:

Dr. George E. Brehman Jr.
Research Associate
Division of Higher Education Research
Bureau of Educational Research
Department of Education
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Harrisburg, Pa. 17126

Appendix D
(continued)

PENNSYLVANIA PHYSICIAN MANPOWER SUPPLY SURVEY

Bureau of Educational Research
Department of Education
Commonwealth of Pennsylvania

Directions:

Below you will find data categories reflecting vitally needed data to complete a study in medical manpower being carried out by the Bureau of Educational Research at the request of the Bureau of Planning Services by the Office of the Commissioner for Higher Education and in cooperation with the Bureau of the Budget of the Governor's Office.

It will, therefore, be greatly appreciated if you will enter all available data appropriate to each item for the school years indicated. Where data are not available, please enter N.A. (Not Available) in the appropriate spot.

Name of School Responding Jefferson Medical College

Name of Responding Official William F. Kellow, M. D. Date November 19, 1971
Dean

School Year	Total Number Applicants	Number Applicants from Pa.	Mean Applicant MCAT	Number Female Applicants	Size of First Year Class (Fall)	Number Penna. Students First Year
1960/61	1,334	625	Not Available	0	176	118
1961/62	1,252	602		38	176	115
1962/63	1,377	663		35	175	126
1963/64	1,739	805		71	178	138
1964/65	2,322	890		152	176	117
1965/66	2,144	982		158	176	106
1966/67	2,037	737		153	176	105
1967/68	2,308	897		170	186	119
1968/69	2,777	830		203	192	138
1969/70	2,984	915		212	192	134
1970/71	3,339	980		272	212	158
1971/72	3,194	1,123		395	212	156

Appendix

(continued)

School Year	Number Female Students First Year	Mean MCAT First Year Class	Size of Second Year Class (Fall)	Size of Third Year Class (Fall)	Size of Fourth Year Class (Fall)
1960/61	0	544	154	147	169
1961/62	9	550	160	150	147
1962/63	10	555	162	156	148
1963/64	12	566	158	158	155
1964/65	11	583	164	156	157
1965/66	13	596	157	165	154
1966/67	13	594	169	157	161
1967/68	16	595	174	168	157
1968/69	22	606	188	169	168
1969/70	19	596	192	185	165
1970/71	26	593	186	195	186
1971/72	28	593	211	193	188

School Year	Number Graduated	Graduates Interning In Penna.	Graduates Meeting Residence Requirements in Penna.	Graduates Currently in Practice in Penna.
1960/61	167	95	120	Not Available
1961/62	146	97	104	
1962/63	148	85	104	
1963/64	154	87	105	
1964/65	157	94	100	
1965/66	154	82	107	
1966/67	161	91	132	
1967/68	157	81	107	
1968/69	167	80	101	
1969/70	165	69	99	
1970/71	184	84	117	
1971/72	188	85*	140	

*Estimate

Appendix D
(continued)

In addition to the above, please indicate the number of students you expect to be able to accept during the next decade. Place an asterisk in front of any figure that is purely an extrapolation rather than a relatively firm figure based on present plans or knowledge.

School Year	Projected or Anticipated First Year Enrollments	
1971/72	212	
1972/73	223	
1973/74	223	
1974/75	223	
1975/76	223	
1976/77	223	
1977/78	223	
1978/79	223	
1979/80	223	

When completed, please return to:

Dr. George E. Brehman Jr.
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Bureau of Educational Research
Department of Education
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Harrisburg, Pa. 17126

Appendix D
(continued)

PENNSYLVANIA PHYSICIAN MANPOWER SUPPLY SURVEY

Bureau of Educational Research
Department of Education
Commonwealth of Pennsylvania

Directions:

Below you will find data categories reflecting vitally needed data to complete a study in medical manpower being carried out by the Bureau of Educational Research at the request of the Bureau of Planning Services by the Office of the Commissioner for Higher Education and in cooperation with the Bureau of the Budget of the Governor's Office.

It will, therefore, be greatly appreciated if you will enter all available data appropriate to each item for the school years indicated. Where data are not available, please enter N.A. (Not Available) in the appropriate spot.

Name of School Responding The Medical College of Pennsylvania

Name of Responding Official Bernard Sigel, M.D. Date January 20, 1972

School Year	Total Number Applicants	Number Applicants from Pa.	Mean Applicant MCAT	Number Female Applicants	Size of First Year Class (Fall)	Number Penna. Students First Year
1960/61	NA	NA	NA	NA	63	21
1961/62	NA	NA	NA	NA	62	11
1962/63	NA	NA	NA	NA	64	16
1963/64	230	NA	NA	230	64	19
1964/65	338	NA	NA	338	60	16
1965/66	309	NA	NA	309	64	14
1966/67	306	NA	NA	306	64	18
1967/68	358	NA	NA	358	66	18
1968/69	350	NA	537	350	66	22
1969/70	379	NA	543	379	66	34
1970/71	727	172	NA	727	66	26
1971/72	1247	420	NA	669	66	40

Appendix D
(continued)

School Year	Number Female Students First Year	Mean MCAT First Year Class	Size of Second Year Class (Fall)	Size of Third Year Class (Fall)	Size of Fourth Year Class (Fall)
1960/61	63	NA	50	48	40
1961/62	62	NA	58	40	46
1962/63	64	NA	58	44	40
1963/64	62	505	63	49	43
1964/65	60	543	58	52	46
1965/66	64	550	54	42	48
1966/67	64	563	63	38	38
1967/68	66	565	58	60	38
1968/69	66	576	63	50	57
1969/70	66	575	72	51	50
1970/71	60	588	71	70	50
1971/72	60	NA	74	73	69

School Year	Number Graduated	Graduates Interning In Penna.	Graduates Meeting Residence Requirements in Penna.	Graduates Currently in Practice in Penna.
1960/61	40	18	NA	19
1961/62	46	26		8
1962/63	40	19		8
1963/64	43	19		10
1964/65	46	18		7
1965/66	48	19		16
1966/67	38	23		12
1967/68	37	10		9
1968/69	57	6		9
1969/70	50	18		14
1970/71	51	22		20
1971/72	68	22		20

Appendix D
(continued)

In addition to the above, please indicate the number of students you expect to be able to accept during the next decade. Place an asterisk in front of any figure that is purely an extrapolation rather than a relatively firm figure based on present plans or knowledge.

School Year	Projected or Anticipated First Year Enrollments	
1971/72	66	
1972/73	73	
1973/74	73	
1974/75	73	
1975/76	73	
1976/77	73	
1977/78	73	
1978/79	73	
1979/80	73	

When completed, please return to:

Dr. George E. Brehman Jr.
Research Associate
Division of Higher Education Research
Bureau of Educational Research
Department of Education
P. O. Box 911
Harrisburg, Pa. 17126

Appendix D
(continued)

PENNSYLVANIA PHYSICIAN MANPOWER SUPPLY SURVEY

Bureau of Educational Research
Department of Education
Commonwealth of Pennsylvania

RECEIVED
MAR - 1972
BUREAU OF [illegible]

Directions:

Below you will find data categories reflecting vitally needed data to complete a study in medical manpower being carried out by the Bureau of Educational Research at the request of the Bureau of Planning Services by the Office of the Commissioner for Higher Education and in cooperation with the Bureau of the Budget of the Governor's Office.

It will, therefore, be greatly appreciated if you will enter all available data appropriate to each item for the school years indicated. Where data are not available, please enter N.A. (Not Available) in the appropriate spot.

Name of School Responding Philadelphia College of Osteopathic Medicine

Name of Responding Official Dr. Sherwood R. Mercer Date March 6, 1972

School Year	Total Number Applicants	Number Applicants from Pa.	Mean Applicant MCAT	Number Female Applicants	Size of First Year Class (Fall)	Number Penna. Students First Year
1960/61	219	N.A.	N.A.	N.A.	91	N.A.
1961/62	251	N.A.	N.A.	N.A.	88	N.A.
1962/63	275	N.A.	N.A.	N.A.	93	N.A.
1963/64	365	N.A.	N.A.	N.A.	89	69
1964/65	400	N.A.	N.A.	N.A.	100	76
1965/66	443	N.A.	N.A.	N.A.	93	61
1966/67	424	N.A.	N.A.	N.A.	95	62
1967/68	432	N.A.	N.A.	N.A.	113	80
1968/69	581	N.A.	N.A.	N.A.	123	82
1969/70	717	N.A.	N.A.	N.A.	145	103
1970/71	742	N.A.	N.A.	N.A.	152	101
1971/72	908	N.A.	N.A.	N.A.	160	102

Appendix D
(continued)

School Year	Number Female Students First Year	Mean MCAT First Year Class	Size of Second Year Class (Fall)	Size of Third Year Class (Fall)	Size of Fourth Year Class (Fall)
1960/61	2	N.A.	65	67	79
1961/62	3	N.A.	86	63	67
1962/63	1	N.A.	74	87	63
1963/64	2	N.A.	85	73	82
1964/65	6	N.A.	86	82	73
1965/66	2	N.A.	93	85	83
1966/67	3	N.A.	94	90	83
1967/68	3	N.A.	82	94	90
1968/69	6	N.A.	113	80	91
1969/70	3	505	125	108	81
1970/71	3	508	143	125	106
1971/72	6	510	152	137	125

School Year	Number Graduated	Graduates Interning In Penna.	Graduates Meeting Residence Requirements in Penna.	Graduates Currently in Practice in Penna.
1960/61	79	30	45	Please see page 6 "1970 - A Profile of Osteopathic Physicians in Pennsylvania"
1961/62	67	37	37	
1962/63	61	27	32	
1963/64	82	39	50	
1964/65	73	31	41	75% of the 1,658 osteopathic physicians practising in Penna. are graduates of P.C.O.M.
1965/66	83	40	39	
1966/67	83	35	52	
1967/68	90	44	60	
1968/69	90	29	60	
1969/70	81	40	53	
1970/71	106	27	64	
Est. 1971/72	125	Not yet known	95	

Appendix D
(continued)

In addition to the above, please indicate the number of students you expect to be able to accept during the next decade. Place an asterisk in front of any figure that is purely an extrapolation rather than a relatively firm figure based on present plans or knowledge.

School Year	Projected or Anticipated First Year Enrollments	
1971/72	160	
1972/73	180	
1973/74	200	
1974/75	225	
1975/76	250	
1976/77	250	
1977/78	250	
1978/79	250	
1979/80	250	

When completed, please return to:

Dr. George E. Brehman Jr.
Research Associate
Division of Higher Education Research
Bureau of Educational Research
Department of Education
P. O. Box 911
Harrisburg, Pa. 17126

Appendix D
(continued)

PENNSYLVANIA PHYSICIAN MANPOWER SUPPLY SURVEY

Bureau of Educational Research
Department of Education
Commonwealth of Pennsylvania

Directions:

Below you will find data categories reflecting vitally needed data to complete a study in medical manpower being carried out by the Bureau of Educational Research at the request of the Bureau of Planning Services by the Office of the Commissioner for Higher Education and in cooperation with the Bureau of the Budget of the Governor's Office.

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Name of School Responding Temple University School of Medicine

Name of Responding Official M. Prince Brigham, M.D. Date January 20, 1972
Assistant Dean

V. Q.
Gen.I. Sciences

School Year	Total Number Applicants	Number Applicants from Pa.	Mean Applicant MCAT	Number Female Applicants	Size of First Year Class (Fall)	Number Penna. Students First Year
1960/61			503 496 501 500		137	
1961/62			511 505 497 504		136	
1962/63			516 497 512 503		138	
1963/64	1790		525 520 535 511	177	137	105
1964/65	2079		523 507 542 522	161	137	104
1965/66			528 549 553 518		137	
1966/67	2051		538 560 554 523		139	102
1967/68			544 568 554 539	176	137	105
1968/69	2471	1021	544 574 558 554		146	115
1969/70	2488	1018	549 576 558 551	187	146	110
1970/71	2572	1065		219	160	125
1971/72	3471	1224		392	160	126

(continued)

School Year	Number Female Students First Year	Mean MCAT First Year Class	Size of Second Year Class (Fall)	Size of Third Year Class (Fall)	Size of Fourth Year Class (Fall)
1960/61	5	520 534 514 541	127	128	127
1961/62	12	518 517 507 521	130	129	126
1962/63	9	542 515 529 555	124	133	124
1963/64	15	540 544 550 562	130	125	132
1964/65	14	562 543 572 577	131	136	124
1965/66	15	584 592 591 566	142	132	132
1966/67	10	555 591 569 568	133	147	131
1967/68	11	557 596 558 576	135	134	143
1968/69	14	561 590 566 593	134	138	134
1969/70	13	573 595 575 594	142	134	136
1970/71	13		144	146	134
1971/72	24		159	145	145

School Year	Number Graduated	Graduates Interning In Penna.	Graduates Meeting Residence Requirements in Penna.	Graduates Currently in Practice in Penna.
1960/61	125			
1961/62	126			
1962/63	124			
1963/64	131			
1964/65	124			
1965/66	132			
1966/67	129			
1967/68	143			
1968/69	134	71		
1969/70	136	60		
1970/71	134	68		
1971/72				

Appendix
(continued)

In addition to the above, please indicate the number of students you expect to be able to accept during the next decade. Place an asterisk in front of any figure that is purely an extrapolation rather than a relatively firm figure based on present plans or knowledge.

School Year	Projected or Anticipated First Year Enrollments	
1971/72	160	
1972/73	180	
1973/74	↓	
1974/75		
1975/76		
1976/77		
1977/78		
1978/79		
1979/80		

When completed, please return to:

Dr. George E. Brehman Jr.
Research Associate
Division of Higher Education Research
Bureau of Educational Research
Department of Education
P. O. Box 911
Harrisburg, Pa. 17126

Appendix D
(continued)

PENNSYLVANIA PHYSICIAN MANPOWER SUPPLY SURVEY

Bureau of Educational Research
Department of Education
Commonwealth of Pennsylvania

Directions:

Below you will find data categories reflecting vitally needed data to complete a study in medical manpower being carried out by the Bureau of Educational Research at the request of the Bureau of Planning Services by the Office of the Commissioner for Higher Education and in cooperation with the Bureau of the Budget of the Governor's Office.

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Name of School Responding University of Pennsylvania School of Medicine

Name of Responding Official Hartwell G. Thompson, M.D Date 9 December 1971

School Year	Total Number Applicants	Number Applicants from Pa.	Mean Applicant MCAT	Number Female Applicants	Size of First Year Class (Fall)	Number Penna. Students First Year
1960/61	1360	414	UNKNOWN	93	125	70
1961/62	1279	359	"	80	125	67
1962/63	1383	455	"	85	129	74
1963/64	1475	473	"	122	126	73
1964/65	1757	559	"	154	127	66
1965/66	1656	490	"	141	125	56
1966/67	1682	466	"	158	125	53
1967/68	1750	437	"	167	133	48
1968/69	1998	504	"	168	132	48
1969/70	2304	501	"	221	151	46
1970/71	2690	491	"	273	150	46
1971/72	2565	585	"	333	160	76

(continued)

School Year	Number Female Students First Year (Fall)	Mean MCAT First Year Class	Size of Second Year Class (Fall)	Size of Third Year Class (Fall)	Size of Fourth Year Class (Fall)
1960/61	6	SEE	125	134	130
1961/62	4	ATTACHED	116	130	134
1962/63	6	SHEET	122	120	130
1963/64	5		128	126	120
1964/65	8		121	134	124
1965/66	6 (Spr)		127	127	132
1966/67	5		127	129	122
1967/68	10		125	130	129
1968/69	11		131	129	128
1969/70	17		133	135	129
1970/71	18		149	136	136
1971/72	17		147	147	140 6 (5th year)

School Year	Number Graduated	Graduates Interning In Penna.	Graduates Meeting Residence Requirements in Penna. at time of admission	Graduates Currently in Practice in Penna.
1960/61	130	66	(89)*	39
1961/62	134	64	(78)	40
1962/63	130	56	(78)	36
1963/64	120	44	(70)	65
1964/65	124	50	(69)	31
1965/66	124	51	(74)	42
1966/67	122	52	(73)	37
1967/68	129	48	(66)	47
1968/69	128	53	(56)	44
1969/70	125	53	(53)	47
1970/71	134	46	(48)	unknown
1971/72	131	49	(48)	unknown
			(figures same as first-year class)	

*an asterisk indicates data sent later and typed in.

Appendix D
(continued)

In addition to the above, please indicate the number of students you expect to be able to accept during the next decade. Place an asterisk in front of any figure that is purely an extrapolation rather than a relatively firm figure based on present plans or knowledge.

School Year	Projected or Anticipated First Year Enrollments	
1971/72	160	
1972/73	"	This figure may be increased if support for basic science faculty salaries and teaching facilities are increased sufficiently enough to handle the increased teaching responsibilities.
1973/74	"	
1974/75	"	
1975/76	"	
1976/77	"	
1977/78	"	
1978/79	"	
1979/80	"	

When completed, please return to:

Dr. George E. Brehman Jr.
Research Associate
Division of Higher Education Research
Bureau of Educational Research
Department of Education
P. O. Box 911
Harrisburg, Pa. 17126

Appendix D
(continued)

Mean MCAT - First Year Class

School Year	Verbal	Quantitative	Gen. Info.	Science
1966-67	600.43	631.53	611.29	580.11
1967-68	602.77	664.11	610.33	597.08
1968-69	624.24	647.95	629.16	628.86
1969-70	646.68	655.27	622.43	617.91
1970-71	623.73	672.90	619.86	604.73
1971-72	624.20	654.50	612.60	620.70

The mean MCAT scores are not available for years preceding 1966

Appendix D
(continued)

PENNSYLVANIA PHYSICIAN MANPOWER SUPPLY SURVEY

Bureau of Educational Research
Department of Education
Commonwealth of Pennsylvania

Directions:

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Name of School Responding University of Pittsburgh School of Medicine

Name of Responding Official Mrs. G. W. Barris Date Feb. 9, 1972

School Year	Total Number Applicants	Number Applicants from Pa.	Mean Applicant MCAT	Number Female Applicants	Size of First Year Class (Fall)	Number Penna. Students First Year
1960/61	N.A.	N.A.	See Attached	N.A.	101	82
1961/62	630	N.A.		45	101	82
1962/63	717	N.A.		42	102	70
1963/64	800	N.A.		43	102	60
1964/65	922	N.A.		43	102	72
1965/66	1279	N.A.		69	101	64
1966/67	1364	N.A.		112	106	60
1967/68	1082	N.A.		80	108	77
1968/69	1250	457		99	107	82
1969/70	1576	620		113	109	81
1970/71	1918	739		147	128	91
1971/72	2705	926		306	130	94

Appendix D
(continued)

School Year	Number Female Students First Year	Mean MCAT First Year Class	Size of Second Year Class (Fall)	Size of Third Year Class (Fall)	Size of Fourth Year Class (Fall)
1960/61	7	See Attached	101	78	93
1961/62	6		96	93	79
1962/63	5		96	89	91
1963/64	8		95	87	89
1964/65	6		91	92	85
1965/66	11		98	87	91
1966/67	7		93	96	84
1967/68	13		96	90	93
1968/69	10		98	96	89
1969/70	4		102	97	95
1970/71	9		108	106	97
1971/72	31		122	107	106

School Year	Number Graduated	Graduates Interning In Penna.	Graduates Meeting Residence Requirements in Penna.	Graduates Currently in Practice in Penna.
1960/61	91	50	77	N. A.
1961/62	78	39	69	"
1962/63	88	45	71	"
1963/64	87	48	68	"
1964/65	84	33	63	"
1965/66	90	52	64	"
1966/67	82	35	49	"
1967/68	93	49	63	"
1968/69	88	42	54	"
1969/70	95	31	53	"
1970/71	96	53	70	"
1971/72	N. A.	N. A.	N. A.	"

Appendix D
(continued)

In addition to the above, please indicate the number of students you expect to be able to accept during the next decade. Place an asterisk in front of any figure that is purely an extrapolation rather than a relatively firm figure based on present plans or knowledge.

School Year	Projected or Anticipated First Year Enrollments	
1971/72	130	
1972/73	135	
1973/74	135	
1974/75	135	
1975/76	135*	
1976/77	135*	
1977/78	135*	
1978/79	135*	
1979/80	135*	

* - Depends entirely on whether faculty and facilities are increased; if so, an increase in entering class size is possible; otherwise, not.

When completed, please return to:

Dr. George E. Brehman Jr.
Research Associate
Division of Higher Education Research
Bureau of Educational Research
Department of Education
P. O. Box 911
Harrisburg, Pa. 17126

Appendix D
(continued)

MEAN APPLICANT MCAT

	Verbal	Quantitative	General Information	Science
1960/61	N. A.	N. A.	N. A.	N. A.
1961/62	507	502	511	501
1962/63	517	511	514	511
1963/64	522	512	526	514
1964/65	520	527	536	512
1965/66	523	532	548	524
1966/67	527	555	557	525
1967/68	541	564	561	528
1968/69	547	579	563	549
1969/70	544	581	560	559
1970/71	555	584	566	561
1971/72	545	591	551	543

Appendix D
(continued)

MEAN MCAT FIRST YEAR CLASS

	Verbal	Quantitative	General Information	Science
1960/61	523	509	531	507
1961/62	507	514	516	522
1962/63	537	547	531	539
1963/64	542	546	549	548
1964/65	556	558	578	547
1965/66	554	597	568	584
1966/67	576	605	600	584
1967/68	550	610	581	569
1968/69	578	631	603	601
1969/70	571	630	587	609
1970/71	577	626	583	597
1971/72	563	616	562	565

APPENDIX E

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

BUREAU OF HEALTH MANPOWER EDUCATION

JUN 25 1971

RECEIVED
JUN 28 1971
BUREAU OF RESEARCH

George E. Brehman, Jr., Ph.D.
Department of Public Instruction
Box 911
Harrisburg, Pennsylvania 17126

Dear Dr. Brehman:

Your letter to Dr. Roger Egeberg of June 10 has been referred to this Division for reply.

The estimate of a 50,000 shortage of physicians originally appeared in the enclosed report entitled "Health Manpower Perspective: 1967." This report also includes a discussion of other estimates of shortages (pp. 9-15).

This 50,000 estimate was reviewed on the basis of 1969 data for physicians. The components of this estimate follow:

--The experience of large medical groups that provide prepaid medical care to specified and selected populations suggests that comprehensive family health services for a population of 100,000 can be provided by 100 physicians. Application of this ratio results in a need for 12,000 physicians in the 27 states that have less than 100 physicians (private practice and full-term hospital staff, excluding psychiatrists) for every 100,000 people;

--8,000 physicians to provide care in urban ghettos and other areas of special need (10 physicians for each of 800 community health centers serving 10,000 people);1/

--15,000 psychiatrists;2/

--10,000 physicians to fill vacancies in hospital internships and residencies;3/

--5,000 physicians in teaching, research, and administration, including 1,700 medical-school faculty positions that are now budgeted but not filled.4/

This method of estimating indicates a requirement for 371,000 physicians in 1970 and 413,000 in 1980.5/

This estimate appears to be relatively conservative for the following reasons:

...The ratio of 100 physicians per 100,000 population is based on an effective organization of medical services for a relatively healthy section of the population.

...Residents of inner cities and other low-income areas tend to be ill more often, and to have more serious illness, than more affluent populations.

...There are considerable supply variations among individual medical specialties. General surgeons appear to be in good supply while shortages exist in family or primary care medicine, internal medicine, pediatrics, obstetrics, physical medicine, radiology, pathology, and psychiatry.

...No allowance is made for replacing any of the 14,500 foreign-trained physicians now serving as interns and residents in hospitals in the United States.

...Requirements for additional physicians to teach students in the health related professions and occupations are growing. In recent years, faculties have been increasing, but vacancies remain high. Meanwhile, new schools of the health and allied health professions are opening, and existing schools are expanding enrollment.

...Staffing requirements for public-health physicians for the administration of community health institutions, agencies, and programs are rising. Health agencies have substantial needs; and medical administrators are needed in Federal programs, hospital administration, prepayment organizations, and union health-and-welfare programs.

...As long as physicians have a high degree of freedom to practice where they choose, it cannot be assumed that those added to the supply will practice in areas of greatest need.

A second method of estimating requirements for physicians is to assume that the country as a whole should have a physician-to-population ratio at least equal to the highest level existing in the nine geographic divisions of the United States as defined by the Bureau of the Census. The Middle Atlantic division (consisting of New Jersey, New York, and Pennsylvania) has the highest such ratio, and this results in an estimated requirement of 392,000 physicians in 1970 and 436,000 in 1980.6/

A third approach is to use the highest state ratio as a desirable goal. The state ratio of active physicians to population is highest in New York. There is no consensual evidence available that this State has more physicians than the numbers necessary to provide quality care to its citizens. Use of the highest state ratio produces an estimated requirement for 478,000 physicians in 1970 and 532,000 in 1980.7/

Other estimates of need have been developed on other bases including economic and income analysis by the Bureau of Labor Statistics, Department of Labor. These estimates project increasing numbers of physicians similar to the estimates derived from the first method outlined above.

It may be helpful to you to know the sources of the various components:

1/ Estimated by the Office of Economic Opportunity.

2/ A memorandum prepared by the National Institute of Mental Health, August 28, 1970, entitled, "Estimates of Unmet Needs With Respect of Mental Health Services," indicated a minimum estimated shortage of psychiatrists of 17,300 in 1970.

3/ There were 11,200 vacancies in 1968-69 in approved programs, as reported in the Directory of Approved Internships and Residencies, 1969-70, published by the American Medical Association.

4/ There were 1,691 budgeted unfilled full-time faculty positions in medical schools in 1968-69, as reported in the 1969-70 Education Number of the Journal of the American Medical Association, November 23, 1970.

5/ The 50,000 shortage added to the 1969 supply of active physicians (315,000) yields a requirement for 365,000 physicians or 177 per 100,000 population. Application of this ratio-to-population estimates based on the "D" series of the Bureau of the Census provides the requirement figures shown.

6/ The 1969 ratio of active non-Federal physicians to population in the Middle Atlantic division (adjusted to include Federal physicians) was 187 per 100,000 population. This ratio was applied to population estimates as above.

7/ The 1969 ratio of active non-Federal physicians to population in New York State (adjusted to include Federal physicians) was 228 per 100,000 population. This ratio was applied to population estimates as above.

We are also enclosing a copy of the most recent NIH publications list and a copy of the report of hearings on pending legislation in the field of health manpower.

I hope that this overview of the national estimates will be helpful to you as you proceed on estimates for Pennsylvania. In turn, we will be most interested in your results.

If we can be of further service to you, please call on us.

Sincerely yours,

WALybrand

William A. Lybrand, Ph.D.
Director
Division of Manpower Intelligence

Appendix F

State and Overall Cost For Equivalent Full Time Medical Student (M.D. and D.O.) Instruction as Budgeted For and Requested By the Medical Schools of Pennsylvania 1971-74[a]

I. State Related Medical Schools

Penn State-Hershey

	1971-72 Budget	1972-73 Budget	1973-74 Requested
State Share	7,649	7,096	8,199
Total Costs	22,970	21,567	20,295
State % Total	33.3%	32.9%	40.4%

University of Pittsburgh

	1971-72 Budget	1972-73 Budget	1973-74 Requested
State Share	7,465	7,465	8,058
Total Costs	14,071	18,046	17,401
State % Total	53.1%	41.4%	46.3%

Temple University

	1971-72 Budget	1972-73 Budget	1973-74 Requested
State Share	7,465	7,465	7,912
Total Costs	14,608	13,836	14,568
State % Total	51.1%	54.0%	54.3%

State Related Institutional Means

	1971-72 Budget	1972-73 Budget	1973-74 Requested
State Share	7,526	7,342	8,056
Total Costs	17,216	17,816	17,421
State % Total	43.7%	41.2%	46.2%

II. State Aided Medical Schools

Hahnemann

	1971-72 Budget	1972-73 Budget	1973-74 Requested
State Share	4,106	4,055	4,322
Total Costs	11,900	14,278	14,264
State % Total	34.5%	28.4%	30.3%

Medical College of Pennsylvania

	1971-72 Budget	1972-73 Budget	1973-74 Requested
State Share	N.A.	N.A.	N.A.
Total Costs	N.A.	N.A.	N.A.
State % Total	-	-	-

	1971-72 Budget	1972-73 Budget	1973-74 Requested
	Philadelphia Osteopathic		
State Share	4,400	4,400	4,600
Total Costs	7,900	9,500	9,900
State % Total	55.7%	46.3%	46.5%
	Thomas Jefferson		
State Share	4,320	4,290	5,000
Total Costs	20,500	24,200	25,470
State % Total	21.1%	17.7%	19.6%
	University of Pennsylvania		
State Share	4,334	4,301	5,000
Total Costs	27,302	28,794	30,413
State % Total	15.9%	14.9%	16.4%
	State Aided Institutional Means		
State Share	4,290	4,262	4,731
Total Costs	16,900	19,193	20,012
State % Total	25.4%	22.2%	23.6%
	Overall Institutional Means		
State Share	5,677	5,582	6,104
Total Costs	17,036	18,603	18,902
State % Total	33.3%	30.0%	32.3%

[a] Based upon data submitted by the medical schools to the Department of Education, Bureau of Budget and Evaluation, Division of College and University Budget.